

Multi-Purpose Simulator

What is it?

What is the Multi-Purpose Simulator (MPS)

- The Multi-Purpose Simulator is a PC based hardware platform used to run various software packages that can generate and receive data.
- It consists of a passive backplane rack mounted PC.
- It can communicate either through serial or IP interfaces.

MPS Interfaces

- Serial Data
 - AVTEC AT-HSIO Card
 - AVTEC Monarch Card
 - ICS Fastcomm Serial Interfaces
- Network Interface
 - Standard 10/100 Network Interface

Serial Interfaces

- AVTEC AT-HSIO Card
 - Supports bits rates up to 2.5 Mbps
 - Supports various output codes
 - ISA based
 - RS 422 or TTL interface
 - Supports internal or external timing

Serial Interfaces

- AVTEC Monarch
 - Supports bits rates up to 15 Mbps
 - Supports various output codes
 - PCI based
 - RS 422 or TTL interface
 - Supports internal or external timing

Serial Interfaces

- ICS Fastcomm Serial Interface Card
 - Supports bits rates up to 2.5 Mbps
 - Supports various output codes
 - PCI based
 - RS 422 interface
 - Supports internal or external timing

AVTEC AT-HSIO

- Advantages
 - Proven Technology
 - Very Reliable
- Disadvantages
 - ISA based – This will limit the machines available for use
 - AVTEC is stopping production.

AVTEC Monarch

- Advantages
 - PCI based
 - Fast
 - Very Reliable
- Disadvantages
 - High Cost – This card costs \$8,000 for the base version and \$15,000 for the full version

ICS Fastcomm Serial Interface

- Advantages
 - Inexpensive – Each card costs only \$500
 - PCI Based
- Disadvantages
 - RS 422 only
 - Not designed to be a true frame sync
 - Not all clock rates are supported.
 - Minimum generated clock rate is 900 bps.

Current MPS Configuration

- Passive Backplane Pentium 3 based PC
- 2 ISC Fastcomm Serial Interface Cards
- 2 AVTEC AT-HSIO Interface Cards
- 10/100 base T network Connection
- 15" LCD Flat Panel Monitor
- CD-RW

MPS Operating Systems

- The MPS can use the following operating systems
 - Microsoft Windows NT with Service Pack 6a
 - Microsoft Windows 2000
 - Microsoft Windows XP
 - Note - Only supports IP communication
 - Linux (Future Implementation)

Scalable, Integrated, Multi-mission Simulation Suite (SIMSS)

- What Is SIMSS?
- SIMMS is a modular based simulation suite.
- It is designed to allow the user to manipulate data.
- It is designed to allow for easy upgrade as additional requirements are identified.

Components of SIMSS

- SIMMS consists of two components
 - Server
 - Client

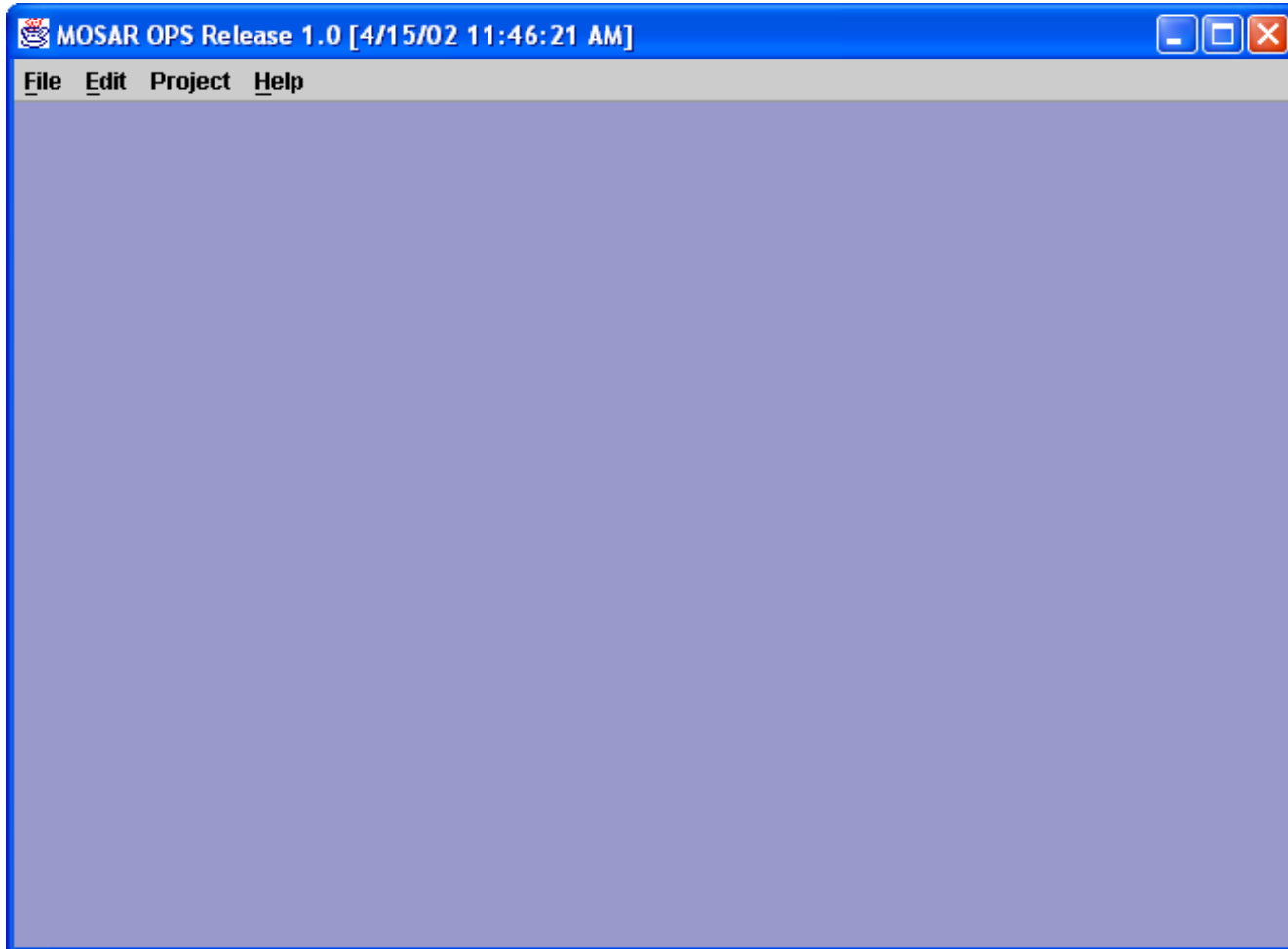
SIMSS Server

- The Server component runs on a PC running Windows NT or Windows 2000. This PC can have Serial Interface Cards in the system.

SIMSS Client

- The Client component can run on a Windows PC. It can run on either the same machine as the Server component or it can run on another PC connected via a LAN to the Server PC.
- The Client is the User Interface
- The Client is Java based

Client Interface Screen



SIMSS Projects / Modules

- The User Interface consists of Projects and Modules
- Projects
 - A Project is a collection of Modules required to perform a logical task
- Modules
 - Modules are the individual components that are designed to perform a specific function.

Module Basics

- Modules can have up to 3 Input Channels and 3 Output Channels. These are used to provide the Software Link between the modules.
- Modules fall into three basic types
 - Run Time Configurable : These can be configured while the module is running.
 - Non-Run Time Configurable: These modules require the module to be stopped prior to any configuration changes.
 - No Configuration Required: These modules are designed for a specific task and require no configuration

Modules

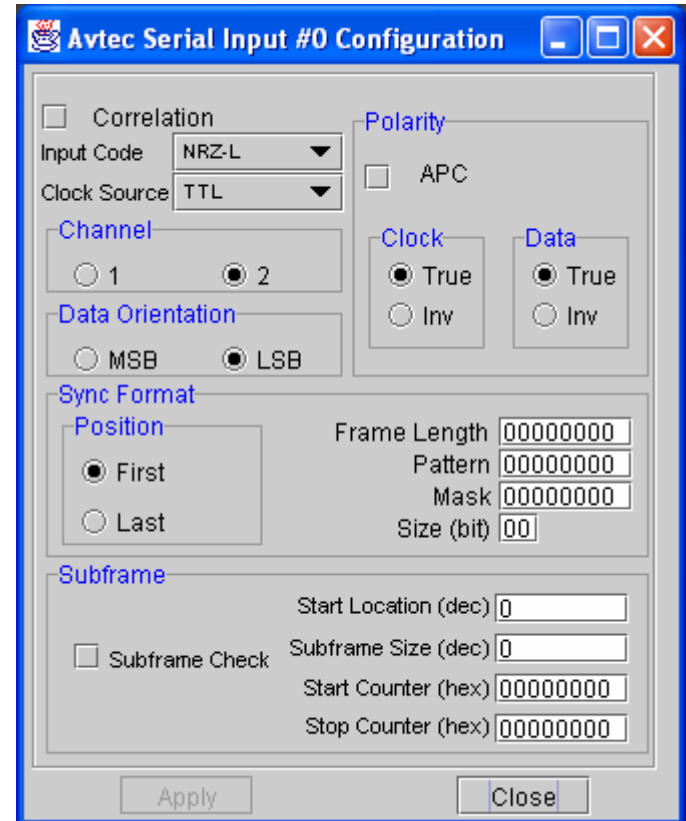
- Modules can be broken down to several categories.
 - Interface Modules
 - Data Generation Modules
 - Data Evaluation Modules
 - Data File Handling Modules
 - Data Manipulation Modules

Interface Modules

- The following Modules provide an Interface from the MPS to external machines.
 - AVTEC Serial Input
 - AVTEC Serial Output
 - Input IP
 - Output IP
 - Serial Output
 - Serial Input

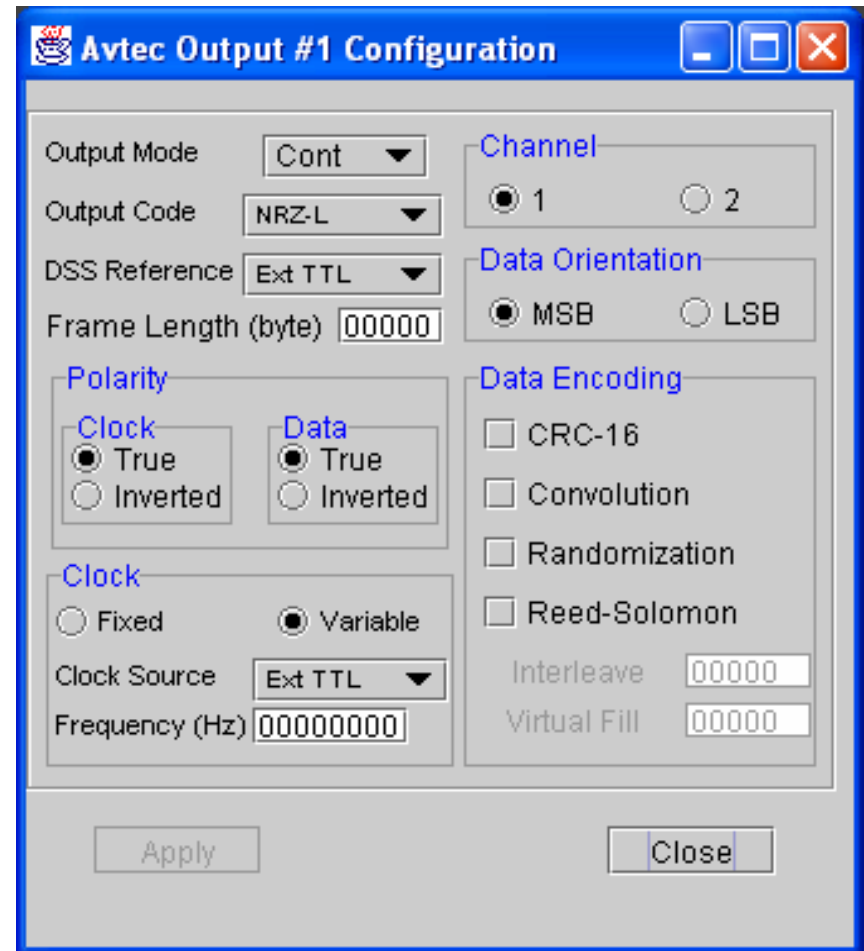
AVTEC Serial Input

- The AVTEC Serial input Module can receive data either 422 or TTL.
- It is user configurable to set for any frame length, up to 4096 bytes



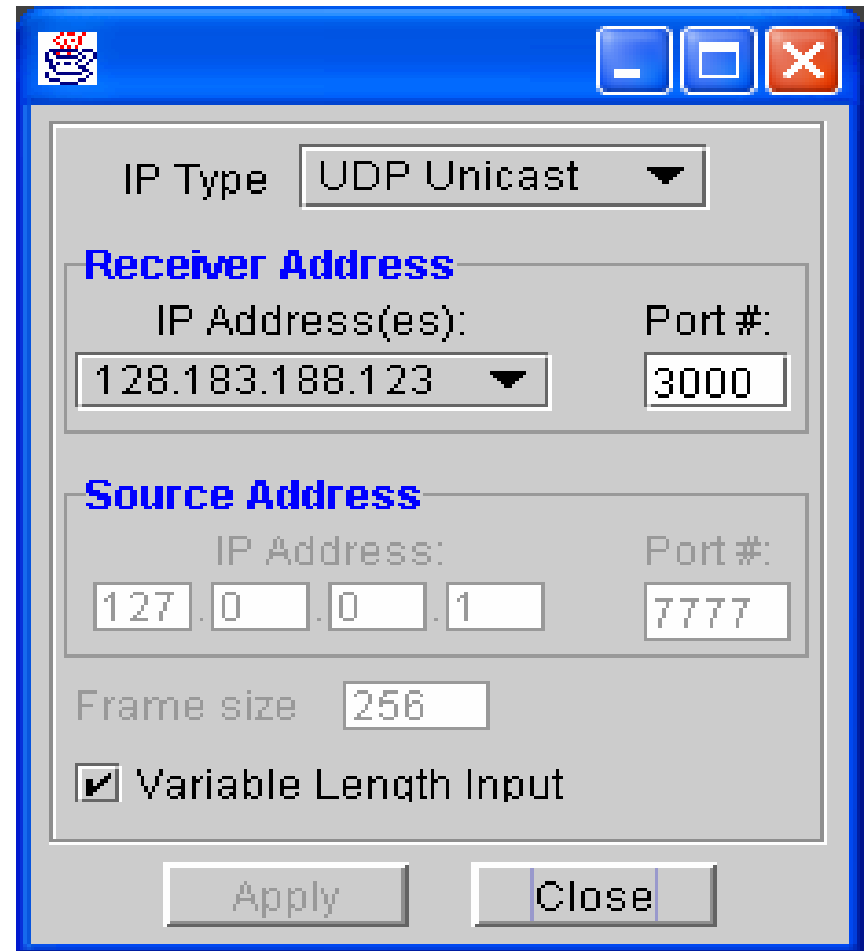
AVTEC Serial Output

- The AVTEC Serial Output Module can output data either 422 or TTL.
- It can send various output codes.
- It supports Frame Lengths up to 4096 bytes.



Input IP

- The Input IP module can receive TCP/IP, Unicast, or Multicast UDP Packets.
- It can receive variable or fixed length packets.
- It can act as either a TCP/IP Client or Server



The screenshot shows a configuration window titled "Input IP" with a blue title bar and standard Windows window controls. The window contains the following fields and options:

- IP Type:** A dropdown menu set to "UDP Unicast".
- Receiver Address:**
 - IP Address(es):** A dropdown menu showing "128.183.188.123".
 - Port #:** A text box containing "3000".
- Source Address:**
 - IP Address:** Four text boxes containing "127", ".0", ".0", and ".1" respectively.
 - Port #:** A text box containing "7777".
- Frame size:** A text box containing "256".
- Variable Length Input:** A checked checkbox.
- Buttons:** "Apply" and "Close" buttons at the bottom.

Output IP

- The Output IP Module can output TCP/IP, Unicast, and Multicast Packets
- It can output fixed or variable length packets
- It can act as a TCP/IP Server or Client

OutputIP #1 Config...

IP Type: UDP Unicast

Sender Address

IP Address(es): 128.183.188.123 Port #: 2001

Destination Address

IP Address: 127.0.0.1 Port #: 7777

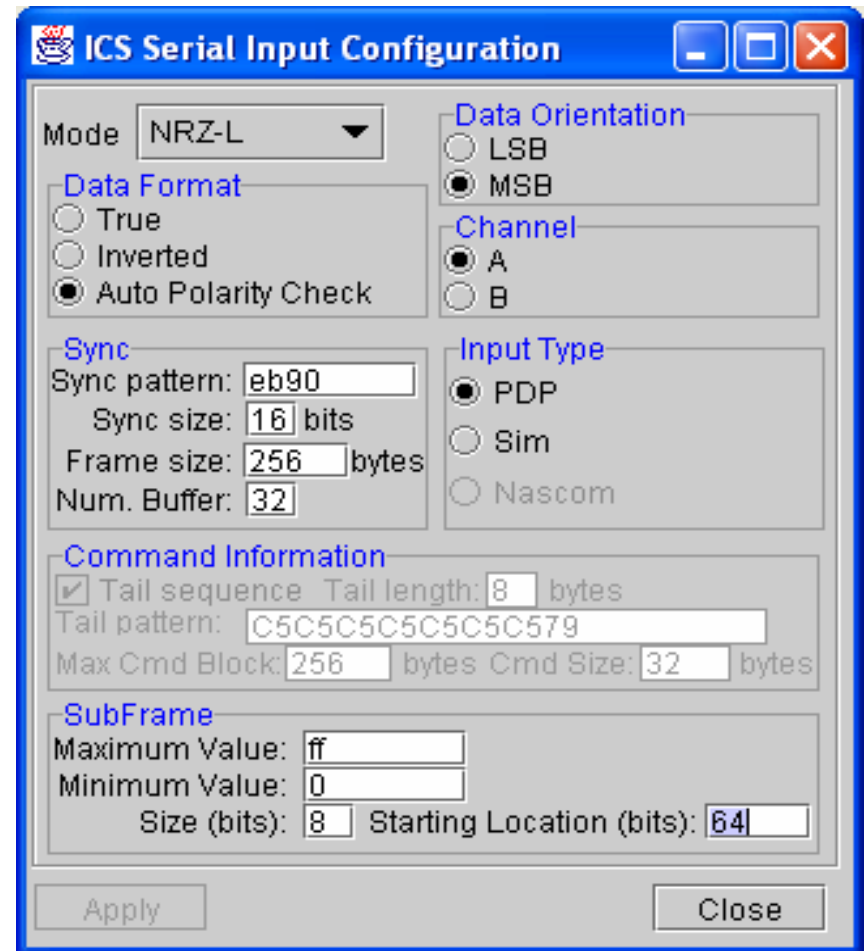
Frame Size: 256

☒ Variable Length Output

Apply Close

Serial Input Module

- This module is used to input data via an RS-422 Interface.
- It can handle frame lengths up to 4096 bytes.



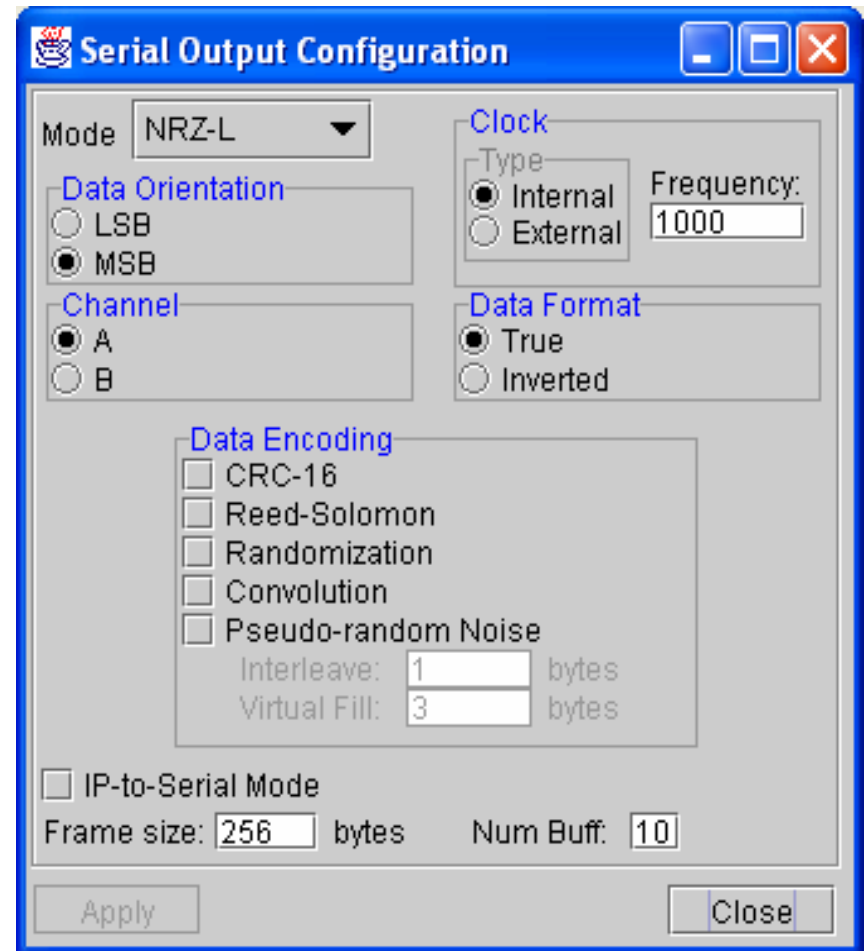
The image shows a Windows-style dialog box titled "ICS Serial Input Configuration". It contains several sections for configuring serial input parameters:

- Mode:** A dropdown menu set to "NRZ-L".
- Data Format:** Three radio buttons: "True" (unselected), "Inverted" (unselected), and "Auto Polarity Check" (selected).
- Data Orientation:** Two radio buttons: "LSB" (unselected) and "MSB" (selected).
- Channel:** Two radio buttons: "A" (selected) and "B" (unselected).
- Input Type:** Three radio buttons: "PDP" (selected), "Sim" (unselected), and "Nascom" (unselected).
- Sync:** Four text input fields: "Sync pattern:" (containing "eb90"), "Sync size:" (containing "16" followed by "bits"), "Frame size:" (containing "256" followed by "bytes"), and "Num. Buffer:" (containing "32").
- Command Information:** A checked checkbox "Tail sequence" followed by "Tail length:" (containing "8" followed by "bytes"), "Tail pattern:" (containing "C5C5C5C5C5C5C579"), "Max Cmd Block:" (containing "256" followed by "bytes"), and "Cmd Size:" (containing "32" followed by "bytes").
- SubFrame:** Three text input fields: "Maximum Value:" (containing "ff"), "Minimum Value:" (containing "0"), and "Size (bits):" (containing "8"). A "Starting Location (bits):" field contains "64".

At the bottom of the dialog are two buttons: "Apply" and "Close".

Serial Output Module

- This module is used to output data via an RS-422 Interface.
- This module can handle frame lengths up to 4096 bytes.
- This module can output various codes of data

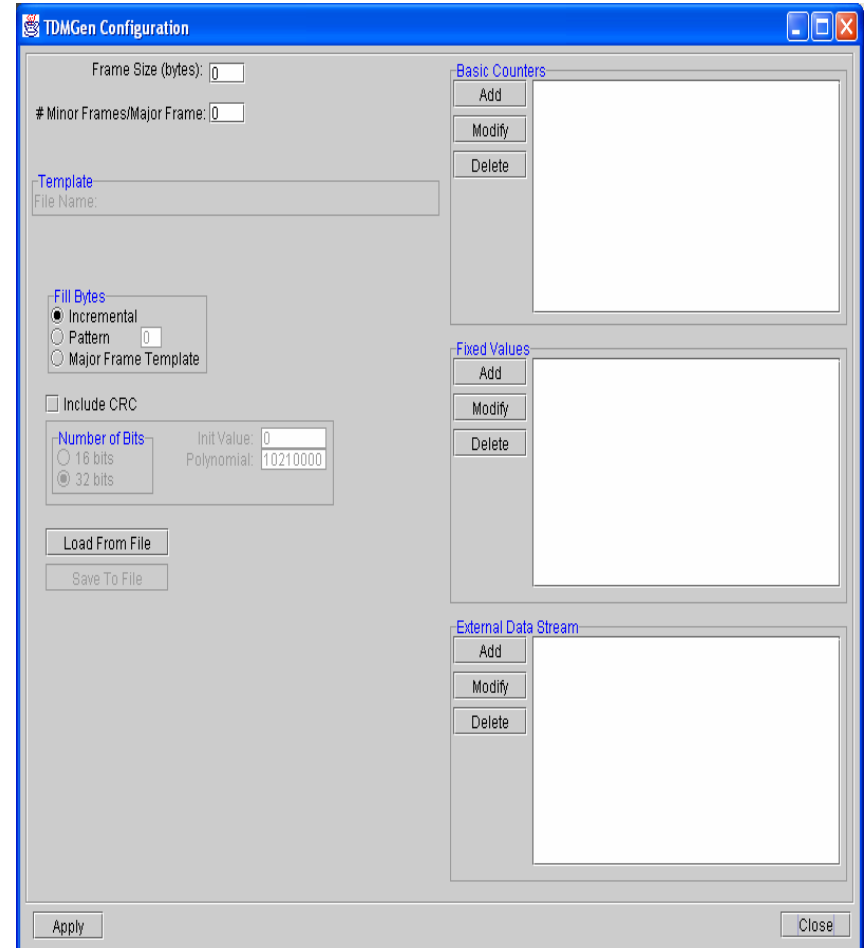


Data Generation Modules

- The following modules are used to generate data.
 - TDMGEN
 - TDMCMDGEN
 - GENTLM
 - CMDXMIT
 - JSC Voice Pattern

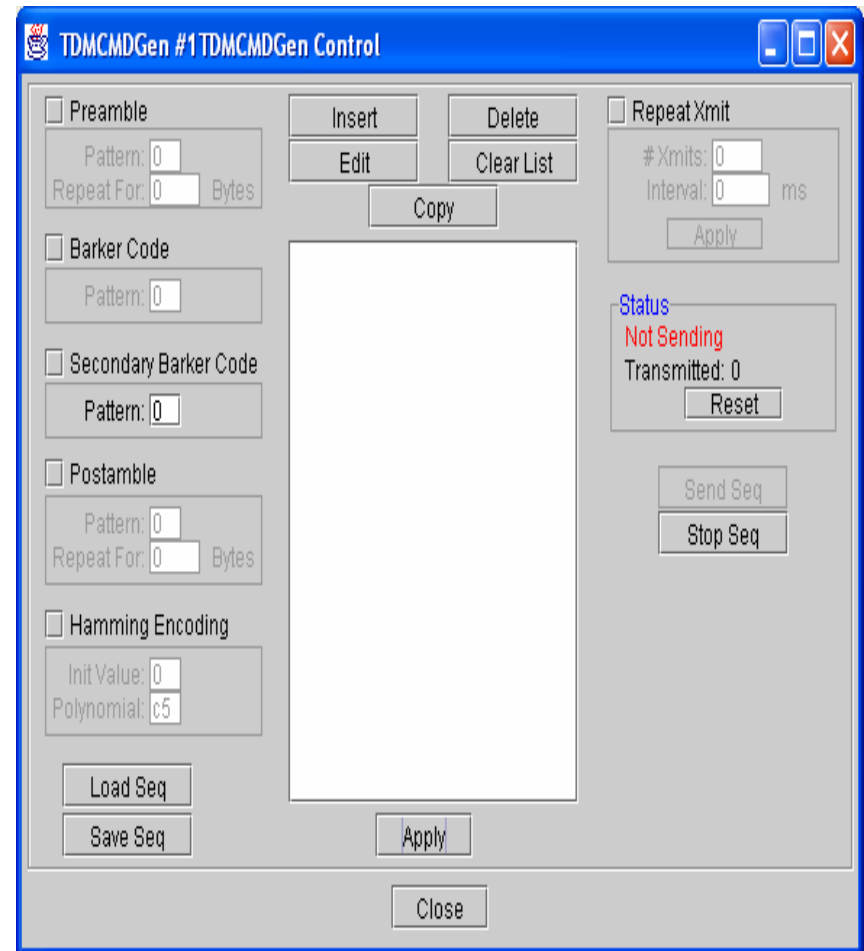
TDMGEN

- This module can be used to generate a TDM Stream of Telemetry data.
- It can insert counters
- It can insert frame sync patterns
- It can insert a major frame of data from a file stored on disk.
- It can receive data from other modules to be muxed into a stream of data.



TDMCMDGEN

- This module can generate TDM style commands.
- It can insert Preamble, Barker Codes, Postamble, and calculate the hamming code.
- It can save and retrieve commands from a disk.

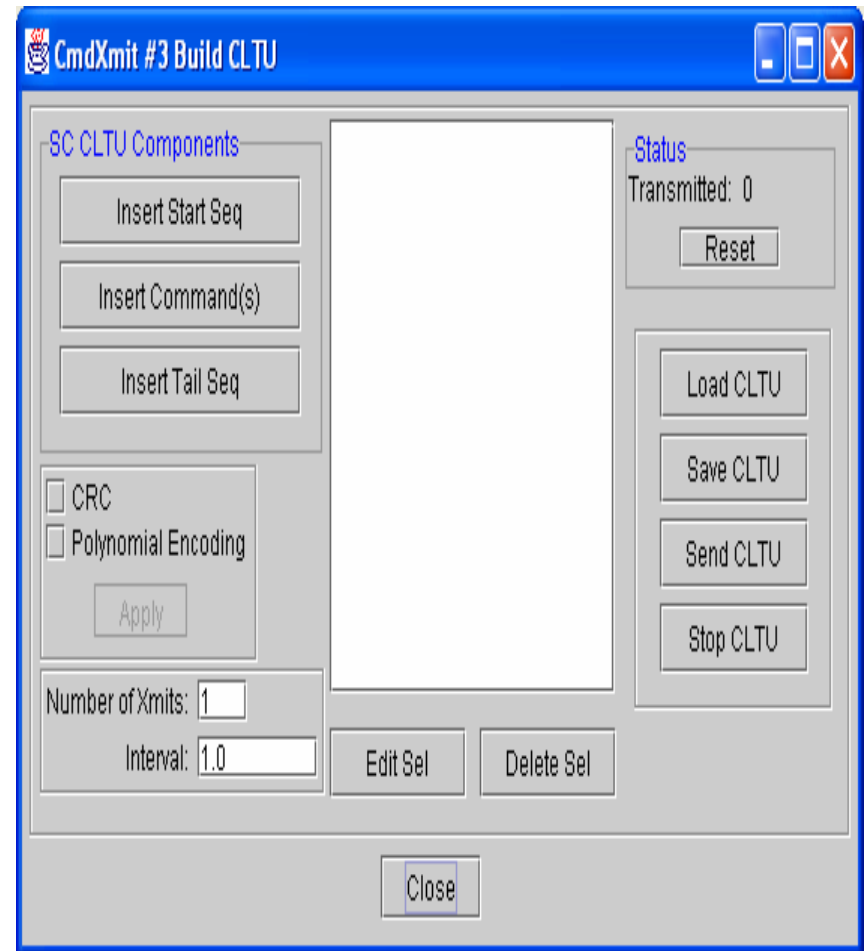


GENTLM

- This module is used to generate CCDS data.
- This module is currently being reviewed. It is not fully supported in this release.

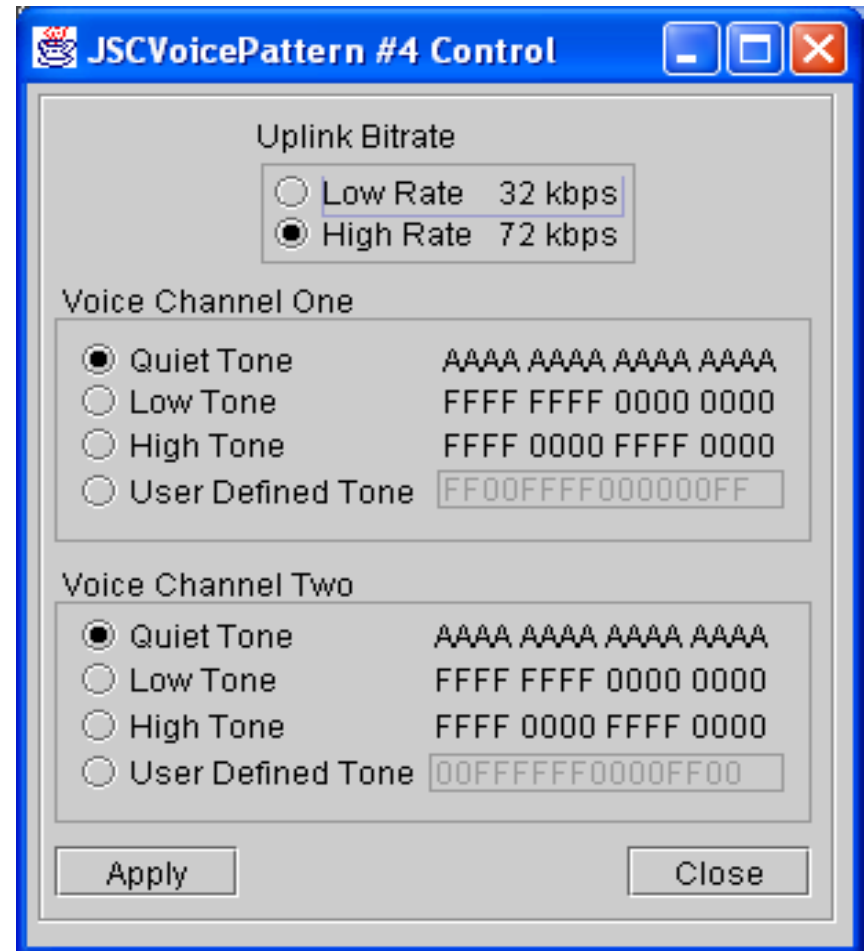
CMDXMIT

- This module is used to build CCSDS style of commands.
- It allows the user to build CLTU (Command Link Transmission Units)
- It allows you to load and save CLTU's.



JSC Voice Pattern

- This module is used to supply the voice patterns for the Shuttle Uplink.
- This module's output is sent to TDMGEN to be incorporated into the orbiter uplink.



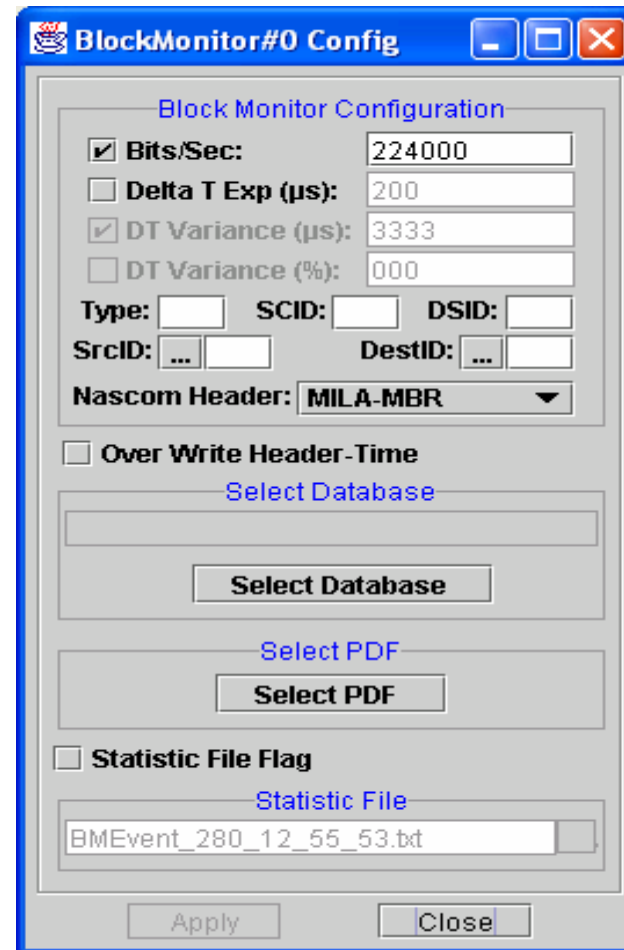
Data Evaluation Class

(Note: some of these modules may also fall into other classes)

- Block Monitor
- Frame Monitor
- Frame Monitor Shuttle
- Generic Command Ingest
- Generic Command Validation
- NASCOM Monitor
- Monitor
- Packet Processor
- Shuttle Command Echo
- Site Status
- TDRSS Checksum
- Track Monitor
- TDM Cmd Ingest
- TDM DQM
- VC Processor

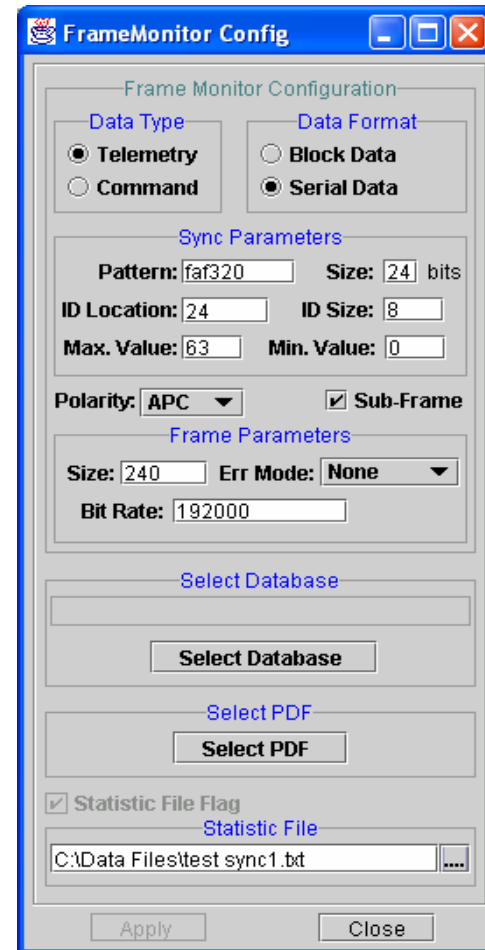
Block Monitor

- This module is used to verify a NASCOM Block
- It can filter on any of the following items
 - Message Type
 - Spacecraft ID
 - Source
 - Destination
 - Data Stream ID
- It has deblocked outputs and blocked outputs



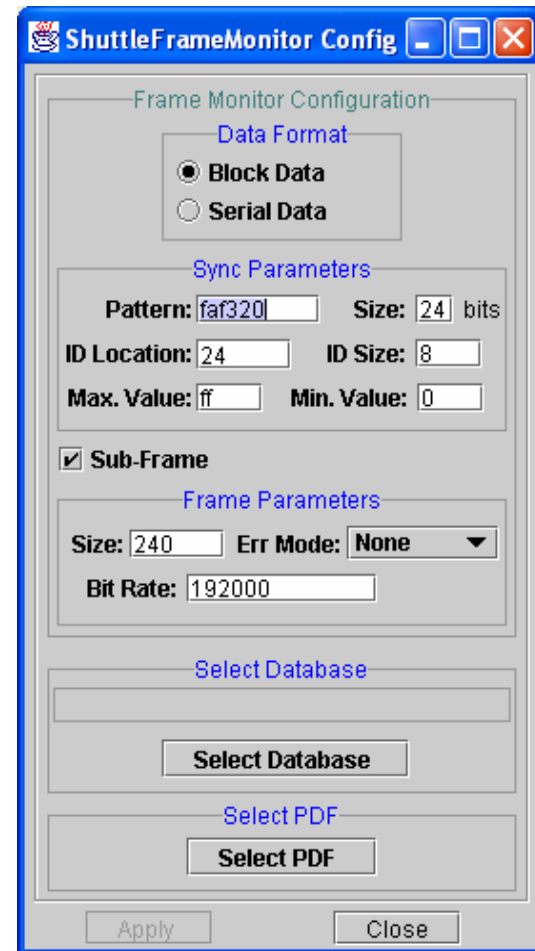
Frame Monitor

- This monitor is used to synchronize data
- It can look for 32 bits of sync
- It can sync on true or inverted data
- It can lock on subframe counters



Frame Monitor Shuttle

- This module is works like the Frame Monitor
- It has the ability to display the orbiter NSP status.
- It also displays the source and destination if it is receiving block data.



Generic Command Ingest

- This module is used to receive CCSDS style of commands
- This module can output Command Link Control Words

The screenshot shows a window titled "Command Status" with a blue title bar and standard Windows window controls. The main area is divided into two sections. The top section displays four statistics: "Total CLTUs: 0", "Rejected CLTUs: 0", "BC Cnds: 0", and "BD Cnds: 0", each with a "Reset" button to its right. Below these is a "Status: Enabled" label. The bottom section is titled "CLCW - VC ID" and contains two rows of data. The first row is labeled "CWT VER STAT COP VCID SP RF BITLOCK LCKOUT" and the second row shows the values "0 0 0 0 0 0 0 0 0". The third row is labeled "WAIT RETRANS FARMB SP REPVAL" and the fourth row shows the values "0 0 0 0 0". At the bottom of this section is a "Virtual Channel ID:" label followed by a text input field and two buttons: "Enable" and "Override". A "Close" button is located at the bottom right of the window.

Statistic	Value	Action
Total CLTUs:	0	Reset
Rejected CLTUs:	0	Reset
BC Cnds:	0	Reset
BD Cnds:	0	Reset

Status: Enabled

CLCW - VC ID

CWT	VER	STAT	COP	VCID	SP	RF	BITLOCK	LCKOUT
0	0	0	0	0	0	0	0	0

WAIT	RETRANS	FARMB	SP	REPVAL
0	0	0	0	0

Virtual Channel ID: Enable Override

Close

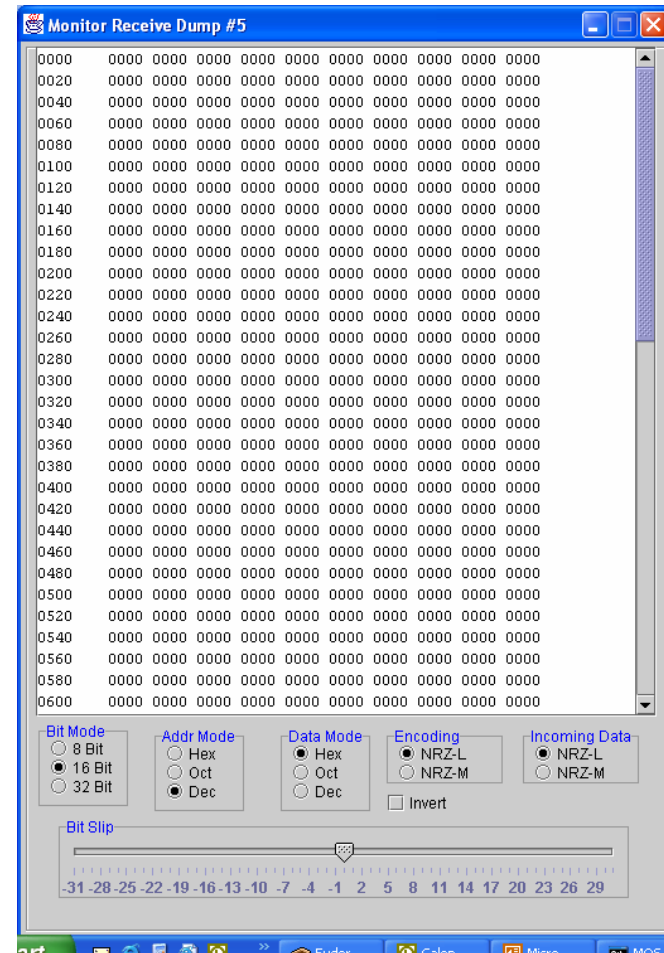
Generic Command Validation

NASCOM Monitor

- This module verifies the RTP header on a incoming IP packet
- It will also display the header information on incoming NASCOM Blocks
- This is useful when you have multiple streams on the same line.

Monitor

- This module is a troubleshooting aid
- It allows the user to exam raw data and bit shift it to the right or left.
- It allows the user to invert the data and code convert for NRZ-L to NRZ-M and back

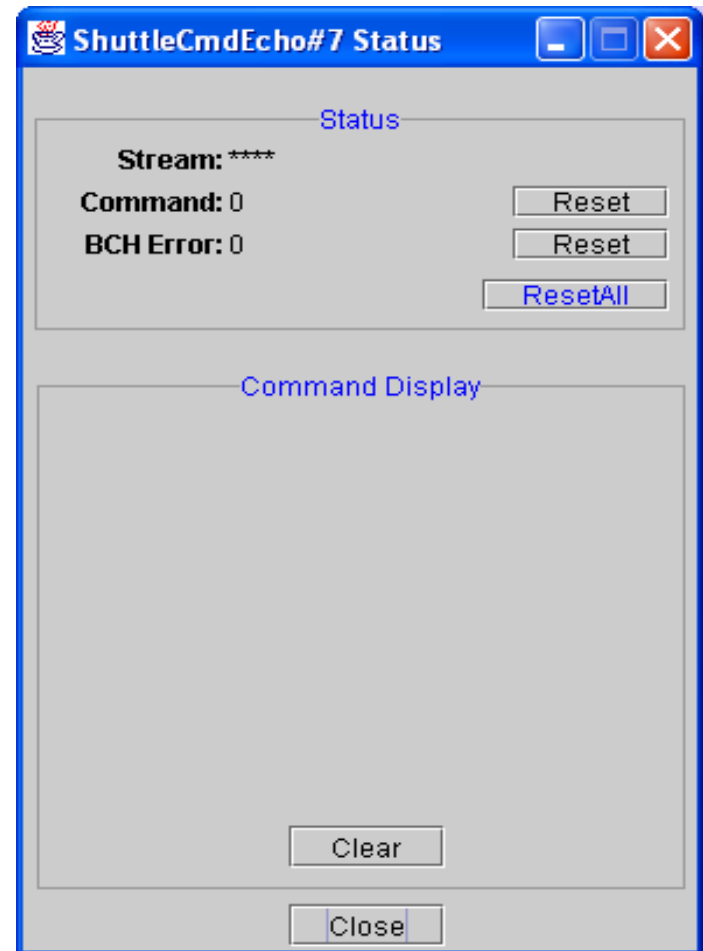


Packet Processor

- This module can receive CCSDS Packets
- It can output selected packets to other modules

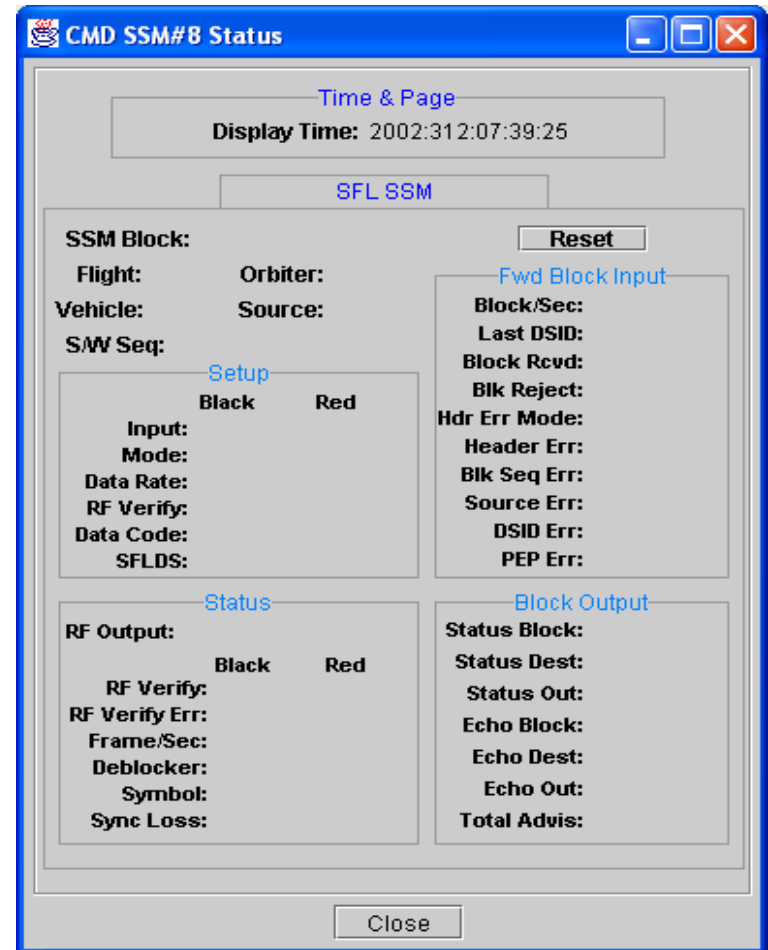
Shuttle Command Echo

- This module accepts a synchronized clear text 72 or 32 kbps orbiter uplink.
- It extracts the command from the command slots and performs a BCH error check
- It outputs the BCH decoded command



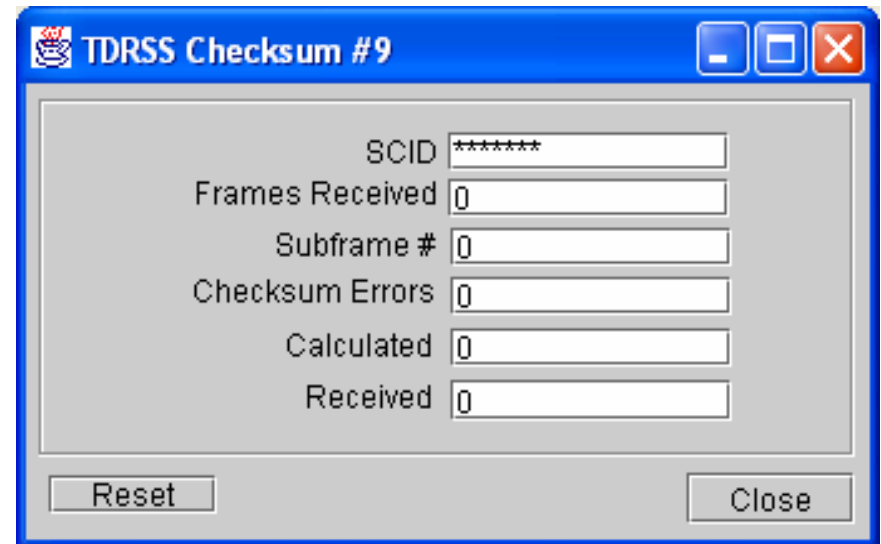
Site Status

- This module displays the site status messages.



TDRSS Checksum

- This module receives a synchronized stream of TDRSS 1 kbps or 4 kbps telemetry
- It performs a CRC check on the data



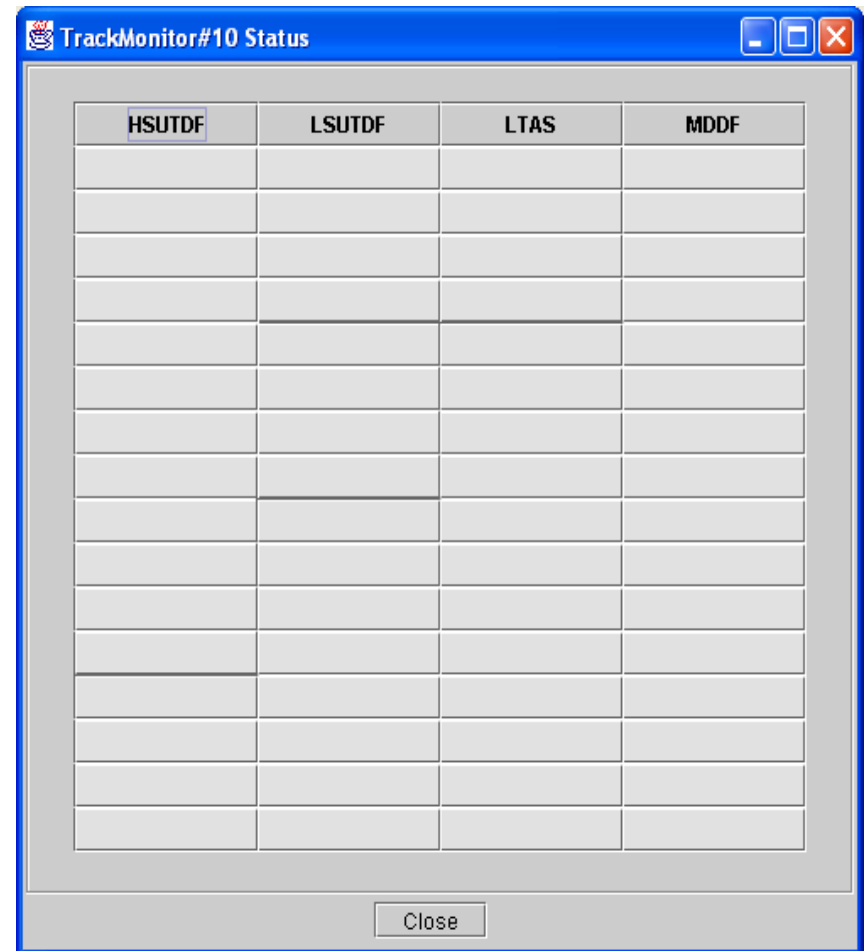
The screenshot shows a Windows-style application window titled "TDRSS Checksum #9". The window has a blue title bar with standard minimize, maximize, and close buttons. The main content area is light gray and contains several labels and text input fields:

- SCID: *****
- Frames Received: 0
- Subframe #: 0
- Checksum Errors: 0
- Calculated: 0
- Received: 0

At the bottom of the window, there are two buttons: "Reset" on the left and "Close" on the right.

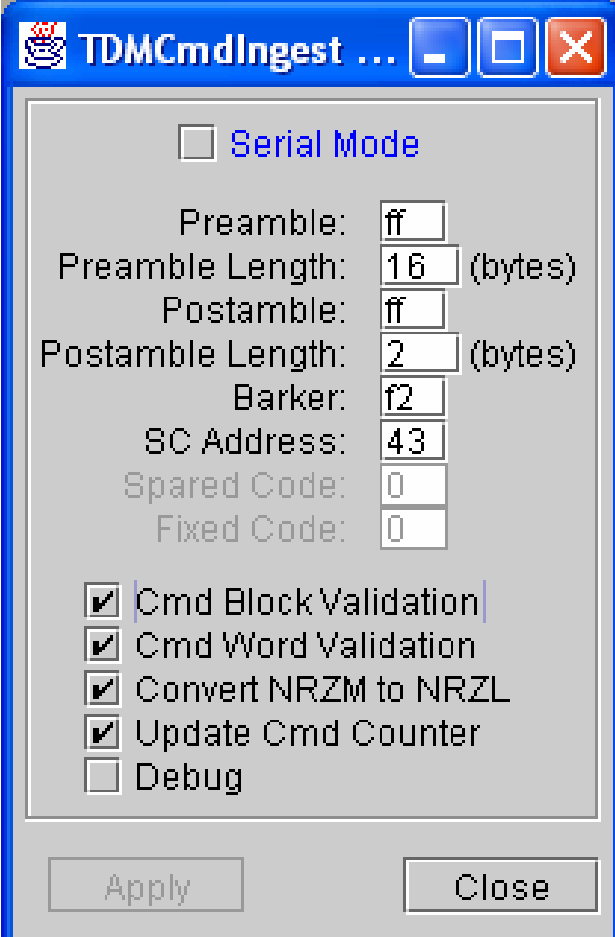
Track Monitor

- This module can receive either NASCOM Blocks or TTY Tracking data
- It can display the source of the data
- It can display the following
 - HSUTDF
 - LSUTDF
 - LTAS
 - MDFF



TDM CMD Ingest

- This module is used to validate TDM style of commands
- It outputs information to other modules to update command counters and command words



The screenshot shows a Windows-style dialog box titled "TDMCmdIngest ...". It contains several configuration options for TDM command ingestion. At the top, there is a checkbox for "Serial Mode" which is currently unchecked. Below this, there are input fields for "Preamble" (set to "ff"), "Preamble Length" (set to "16" with "(bytes)" next to it), "Postamble" (set to "ff"), and "Postamble Length" (set to "2" with "(bytes)" next to it). Further down are fields for "Barker" (set to "f2"), "SC Address" (set to "43"), "Spared Code" (set to "0"), and "Fixed Code" (set to "0"). A group of five checkboxes follows: "Cmd Block Validation" (checked), "Cmd Word Validation" (checked), "Convert NRZM to NRZL" (checked), "Update Cmd Counter" (checked), and "Debug" (unchecked). At the bottom of the dialog are two buttons: "Apply" and "Close".

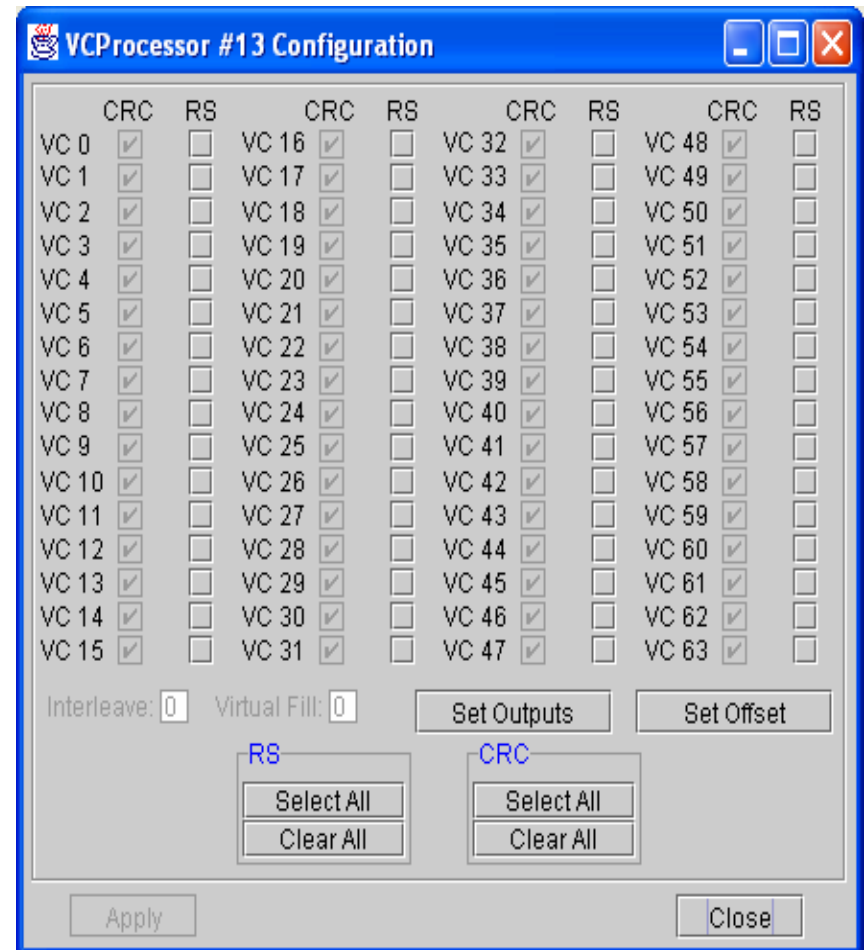
Option	Value
Serial Mode	<input type="checkbox"/>
Preamble	ff
Preamble Length	16 (bytes)
Postamble	ff
Postamble Length	2 (bytes)
Barker	f2
SC Address	43
Spared Code	0
Fixed Code	0
Cmd Block Validation	<input checked="" type="checkbox"/>
Cmd Word Validation	<input checked="" type="checkbox"/>
Convert NRZM to NRZL	<input checked="" type="checkbox"/>
Update Cmd Counter	<input checked="" type="checkbox"/>
Debug	<input type="checkbox"/>

TDM DQM

- This module is used to evaluate TDM data
- It can look for sync and subframe counters
- It can extract minor frames or bytes of data
- It has 3 outputs to send the extracted data to other modules

VC Processor

- This module receives CCSDS data
- It processes the Virtual Channels and outputs selected channels

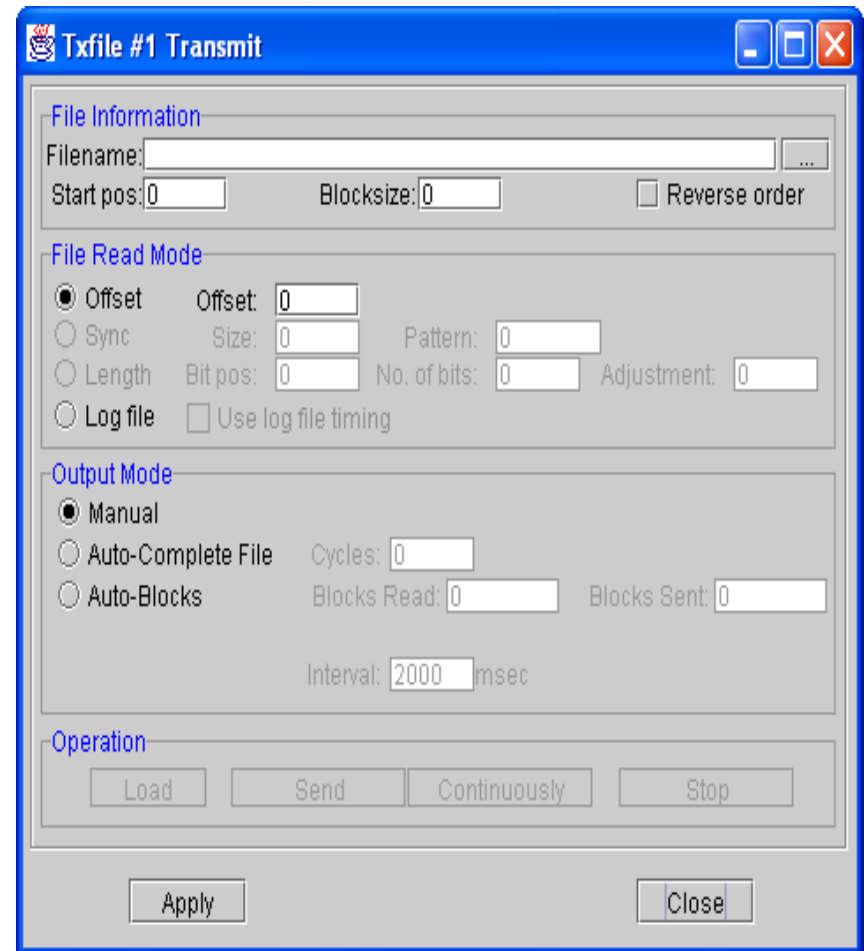


Data File Handling Modules

- These modules allow the user to store or retrieve data to a disk or CD.
 - TXFILE
 - LogModule

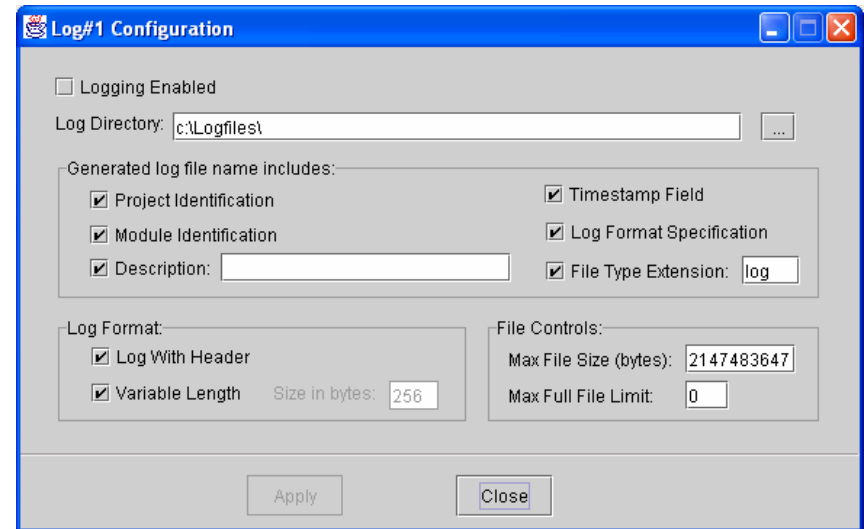
TXFILE

- This module allows the user to select a file from any disk in the system.
- It allows the data to be transmitted in multiple different modes



LogModule

- This module allow the user to store data on any disk drive in the system that the user has write access.
- It can log with a SIMSS header that allows to user to play back a burst data stream (Speed limitations do Apply)

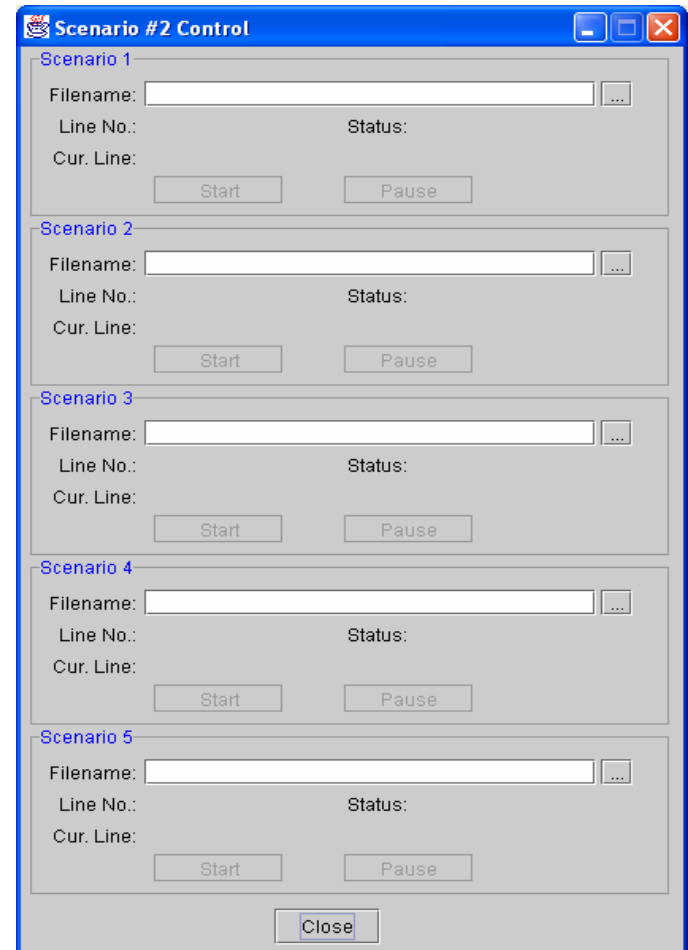


Data Manipulation Modules

- Scenario
- TDMDemux
- TImMod
- Wrapper
- Test Module
- JSC CMD Encode

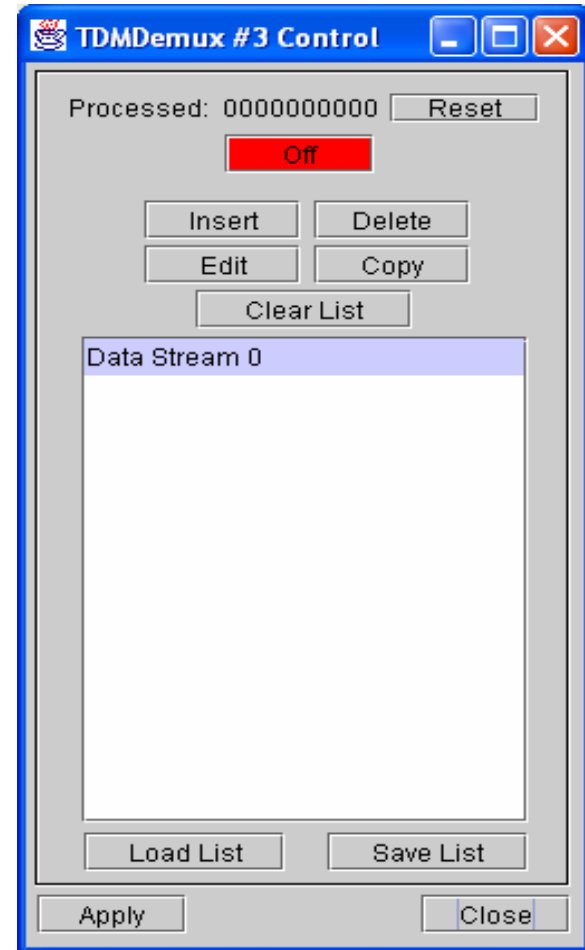
Scenario

- This module reads directives from specified scenario files line by line and passes them to down-linked modules for processing.



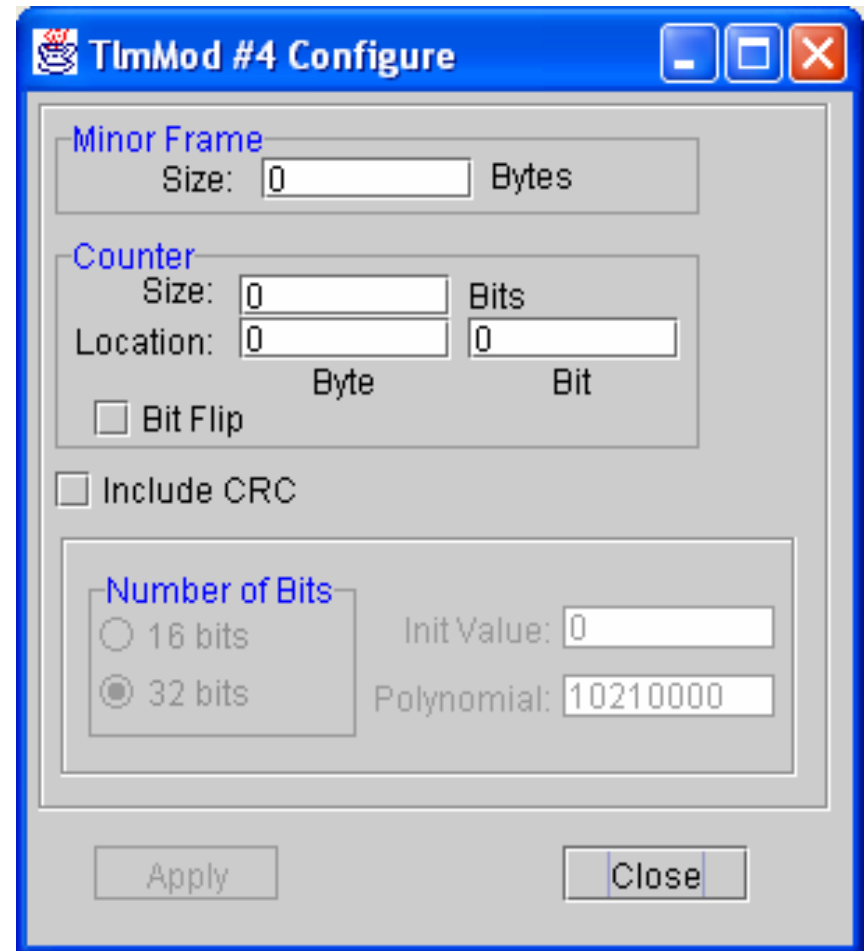
TDMDemux

- This module allows the user to extract data from a TDM stream and assemble it into a stream of data.



TlmMod

- This module allows the user to receive TDM telemetry stream and modify data points in the stream



The screenshot shows a Windows-style dialog box titled "TlmMod #4 Configure". It contains several configuration sections:

- Minor Frame**: A section with a "Size:" label and a text box containing "0", followed by the word "Bytes".
- Counter**: A section with "Size:" and "Location:" labels, each followed by a text box containing "0". To the right of the "Size:" text box is the word "Bits". Below the "Location:" text box is the word "Byte". To the right of the "Location:" text box is another text box containing "0", with the word "Bit" below it. There is also a checkbox labeled "Bit Flip".
- Include CRC**: A checkbox.
- Number of Bits**: A section with two radio buttons: "16 bits" and "32 bits". The "32 bits" option is selected. To the right of these radio buttons is a text box labeled "Init Value:" containing "0". Below the radio buttons is a text box labeled "Polynomial:" containing "10210000".

At the bottom of the dialog box are two buttons: "Apply" and "Close".

Wrapper

- This module can package data into a 4800 bit NASCOM Block
- It also allows for a RTP header to be placed at the beginning of the block for IP transmission

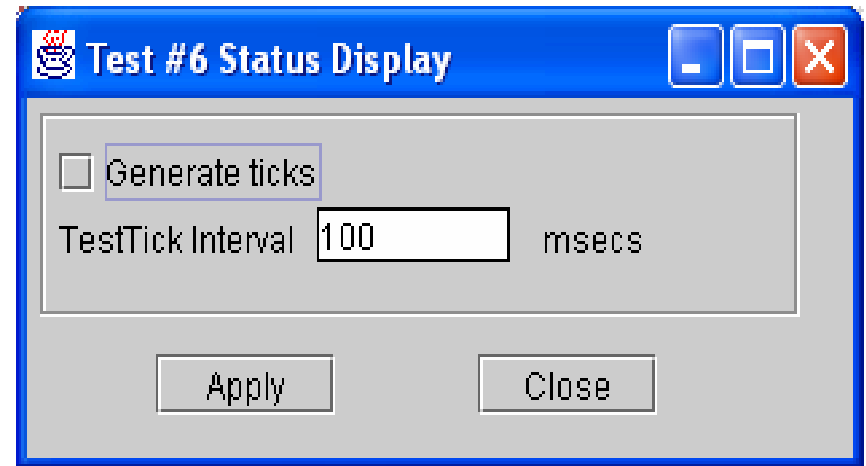
The screenshot shows a Windows-style dialog box titled "Wrapper #5 Header Selection". It contains several sections for configuring header information:

- Header Format Selection:** Includes checkboxes for "RTP Header" and "Variable Length". Below is a "Type" section with radio buttons for "POCC-to-JSCCmd", "MDM", "JSCPD", "DSN", "GN", "Custom", and "None".
- Nascom Header:** A list of fields with text input boxes and radio buttons for Hex, Oct, and Dec formats:
 - SOURCE
 - DESTINATION
 - FORMAT ID
 - SPACECRAFT ID
 - SRC SEQ CTR
 - SPARE
 - BLK SEQ CTR 2
 - MESSAGE TYPE
 - DEST CODE
 - DATA LEN
- POCC to JSC Command Header:** Another list of fields with text input boxes and radio buttons for Hex, Oct, and Dec formats:
 - CMD MSG NUM
 - VEHICLE ID
 - CMD WD NUM
 - CMD TYPE
 - OR UPLK MODE
- Trailer:** Includes a "BLK SRL NUM" field with a text input box and radio buttons for Hex, Oct, and Dec formats.

At the bottom of the dialog are three buttons: "Load Config File", "Apply", and "Close".

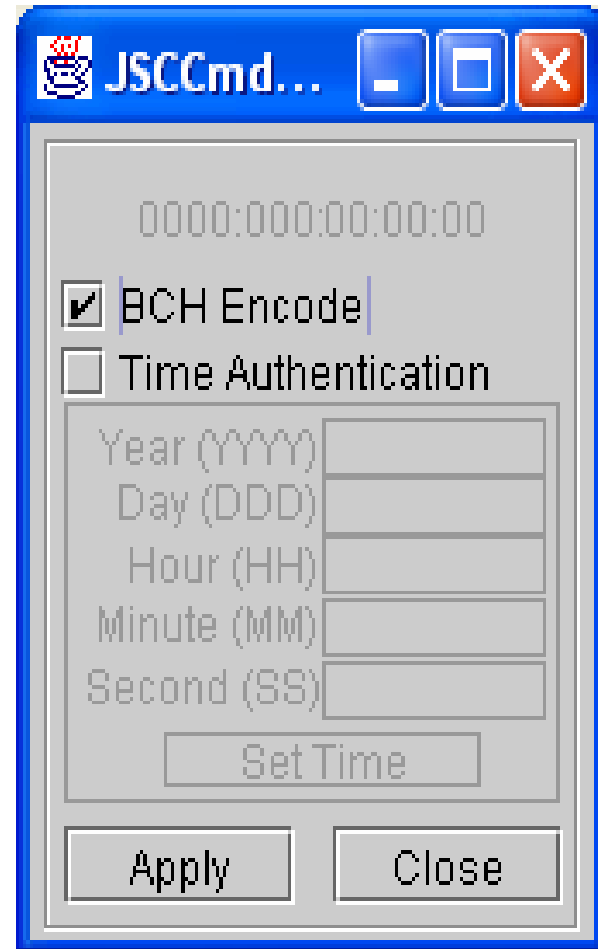
Test Module

- This module generate ticks to control the timing of other modules
- Ticks are software signals that are used to kick off events



JSC CMD Encode

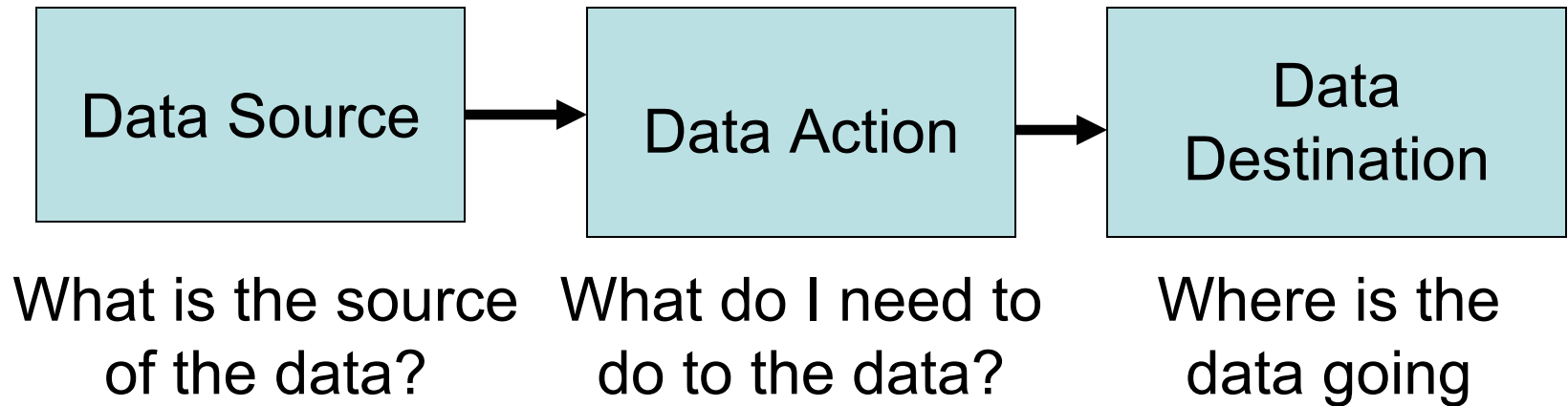
- This module is used in conjunction with TDMCmdGen and TDMGem
- It accepts a 48 bit shuttle command and BCH encodes it
- It will also Time Authenticate the command



Creating a New Project

- The first step in creating a new project is to determine what modules will be required to be utilized.
- Projects need to be broken down into their logical parts
- Almost every project will look something like this

Logical Project



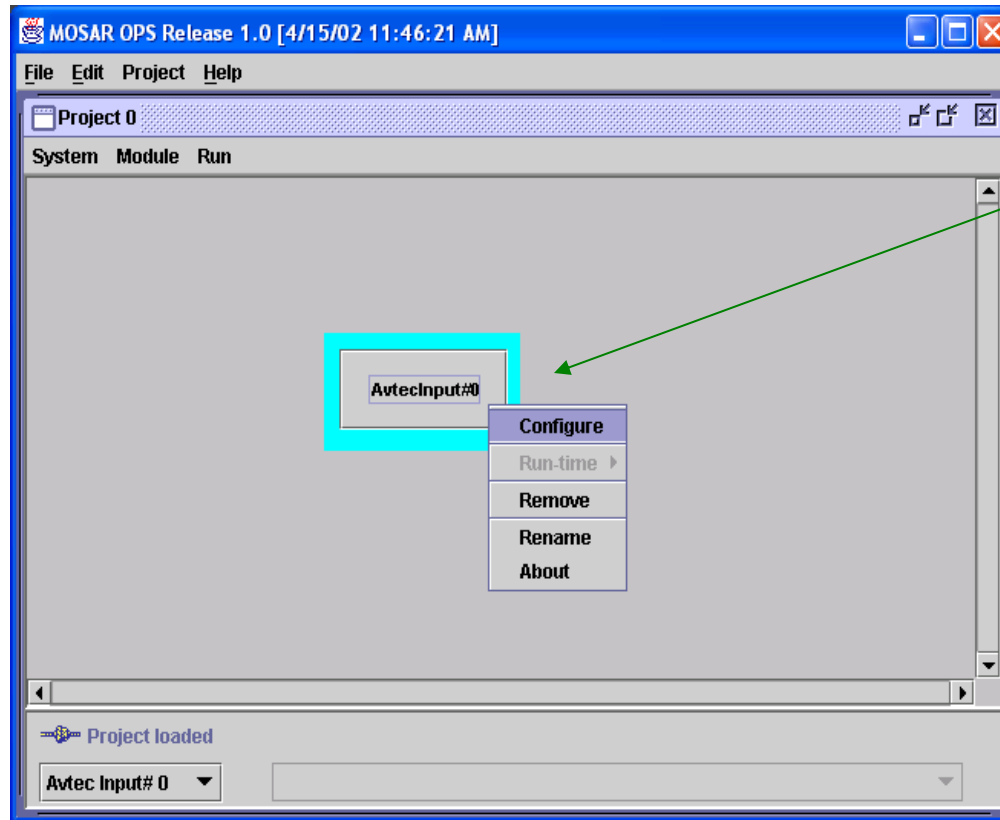
Configuring Modules

- The next step in building a project is configuring the modules
- A detailed description of each module can be obtained in either the SIMSS Users Guide or the MOSAR Users Guide.
- The following section is a brief description of the configuration of the some of the most commonly used modules

Interface Modules

- The following Modules provide an Interface from the MPS to external machines.
 - AVTEC Serial Input
 - AVTEC Serial Output
 - Input IP
 - Output IP
 - Serial Output
 - Serial Input

AVTEC Serial Input Module



Clicking on the Module will open the following window. This is used to access the configuration

This allows you to select the module for use of SET DIRECTIVES. See uses guide for these directives

The AVTEC Serial Input Module has no Input Channels and 1 Output Channel.

It is a Non-Run Time Configurable Module

AVTEC Serial Input Configuration

Allows the user to look for sync or just pass all data into the system

Select between NRZ-L , M , or S

Select TTL or 422 for the Source of the Data and Clock

Determines which card is to be used

These items are not yet fully implemented.

Avtec Serial Input #0 Configuration

☐ Correlation

Input Code: NRZ-L

Clock Source: TTL

Channel: ☐ 1 ☒ 2

Data Orientation: ☐ MSB ☒ LSB

Sync Format Position: ☒ First ☐ Last

Polarity: ☐ APC

Clock: ☒ True ☐ Inv

Data: ☒ True ☐ Inv

Frame Length: 00000000

Pattern: 00000000

Mask: 00000000

Size (bit): 00

Subframe: ☐ Subframe Check

Start Location (dec): 0

Subframe Size (dec): 0

Start Counter (hex): 00000000

Stop Counter (hex): 00000000

Apply Close

Auto Polarity Correction

Selects the Clock and data phase. If APC is **ON** these are not used

Frame Length in Bytes, Maximum is 4096

Frame Sync Pattern Maximum 32 bits

Used in conjunction with frame sync Must be 32 bits

Used to detect SubFrame

Use Frame Monitor for this function

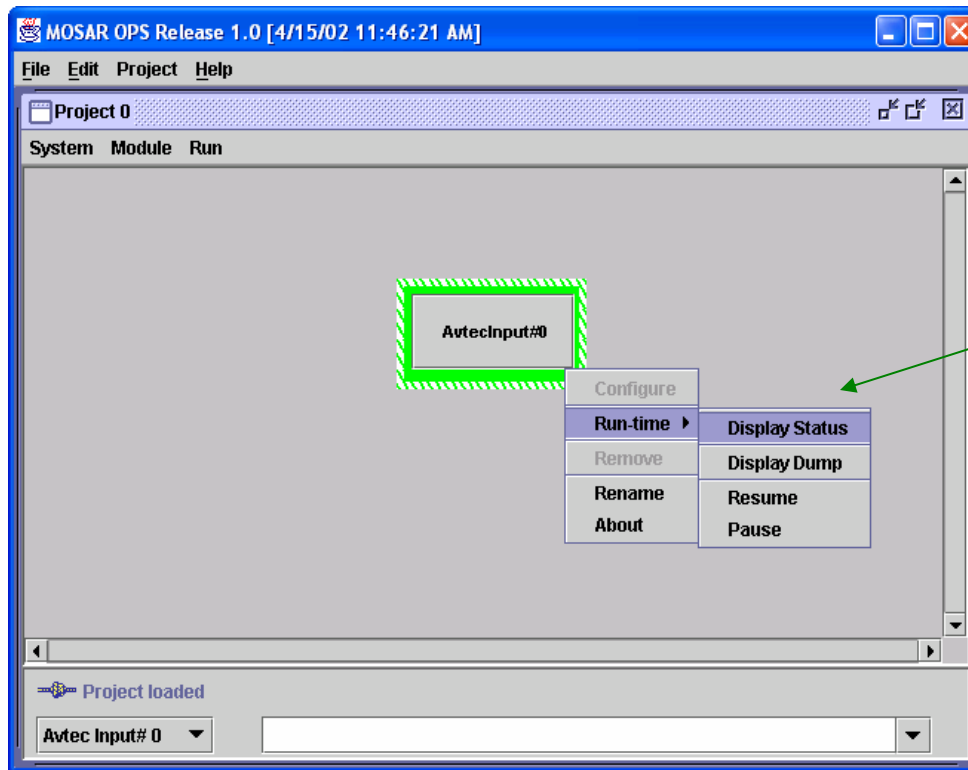
Configuring the Frame Sync in the AVTEC Serial Input

- You must enter 32 bits of information in both the Frame Sync and Mask. The Sync Length must always be set to 32 bits.
- The Frame Sync and Mask work in tandem to determine whether the data is good.
- For every bit of sync to be checked a 1 must be entered in the mask

Setting the Sync and Mask

- Example 1: Frame Sync FAF320_{HEX}
 - In the Frame Sync window you must enter FAF32000
 - In the Mask window you must enter FFFFFFF00
- Example 2: Frame Sync EB90_{HEX}
 - In the Frame Sync window you must enter EB900000
 - In the Mask window you must enter FFFF0000

AVTEC Serial Input Run Time



The Run Time Drop Down Windows allow the User to open the Status Window, Display the Raw Data, Stop, or restart the module

AVTEC Serial Input Status Display

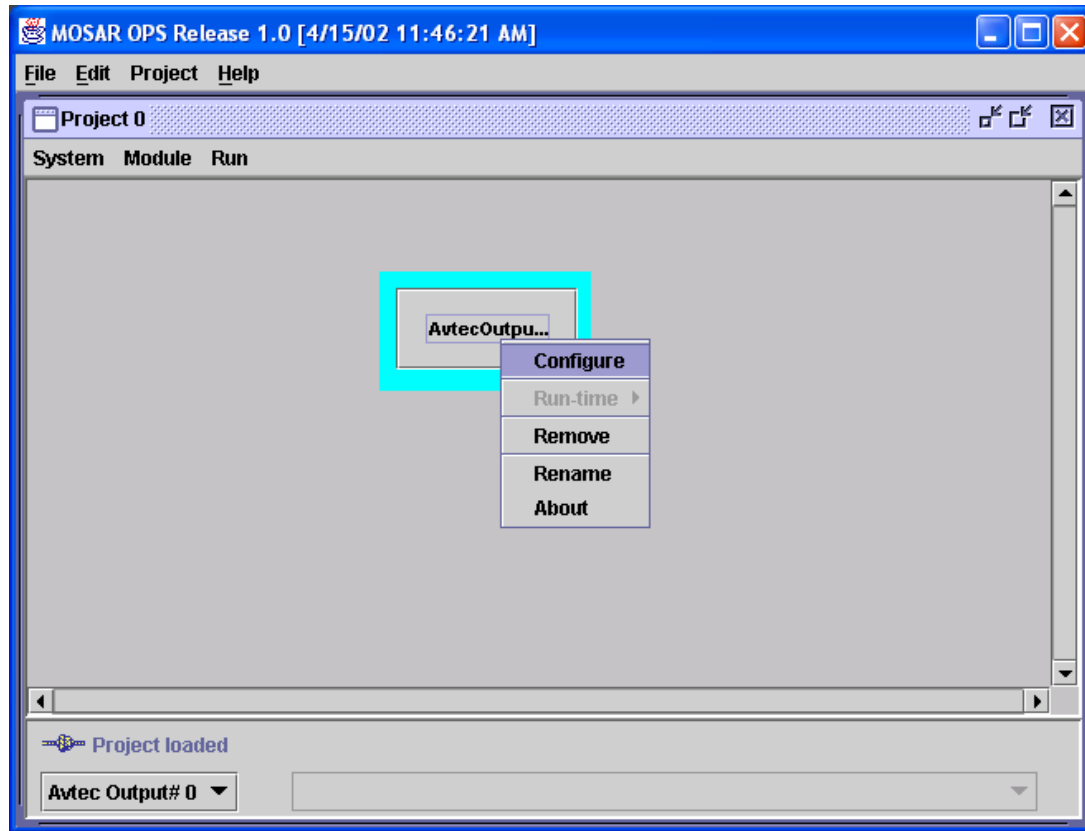
Displays the frame and subframe information

Displays the configuration information

The screenshot shows a window titled "Avtec Input #0 Status". It contains two main sections: a status section at the top and a settings section below it. The status section displays four counters: Frame Count, Frame Drops, SubFrame Count, and SubFrame Drops, all currently at 0. To the right of these counters are four individual "Reset" buttons and a "Reset All" button. The settings section is titled "Settings" and lists various configuration parameters with their current values. At the bottom of the window is a "Close" button.

Parameter	Value
Frame Count	0
Frame Drops	0
SubFrame Count	0
SubFrame Drops	0
Correlation	ON
Input Code	NRZ-L
Clock Source	RS422
APC	ON
Data Polarity	True
Clock Polarity	True
Data Orientation	MSB
Sync Format	First
Sync Pattern	62762700
Sync Mask	ffff00
Sync Size	32 (bits)
Frame Length	600
Channel Active	1
SubFrame	OFF
SubFrame Start Location	0
SubFrame Size	0
SubFrame Start Counter	0
SubFrame Stop Counter	ff

AVTEC Serial Output



The AVTEC Serial Output Module has 1 Input Channel and
no Output Channels

It is a Non-Run Time Configurable Module

AVTEC Serial Output Configuration

Continuous or Burst
Which works best
depends on the
source of the data

Selects NRZ-L,M,S
or BIØ- L,M,S for
Output

Not Implemented

Selects the
Output Polarity
of the Clock and
Data

Use Fixed Clock
Variable Clock
not fully
implemented

Select Internal,
External 422 or
External TTL Clock

Internal Clock Rate

Avtec Output #1 Configuration

Output Mode:

Output Code:

DSS Reference:

Frame Length (byte):

Channel
☒ 1 ☐ 2

Data Orientation
☒ MSB ☐ LSB

Polarity
Clock: ☒ True ☐ Inverted
Data: ☒ True ☐ Inverted

Clock
☐ Fixed ☒ Variable

Clock Source:

Frequency (Hz):

Data Encoding
☐ CRC-16
☐ Convolution
☐ Randomization
☐ Reed-Solomon

Interleave:

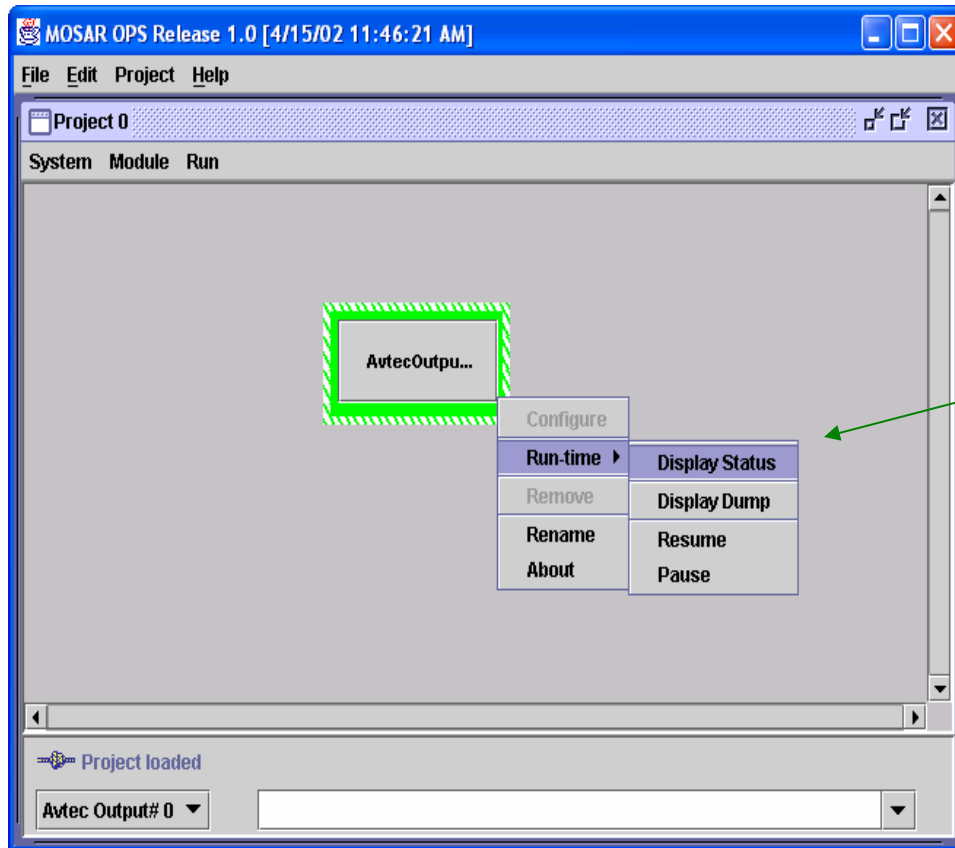
Virtual Fill:

Select which
AVTEC Card is to
be used

Allows for transmission
in LSB Mode. You
need to really want to
do this

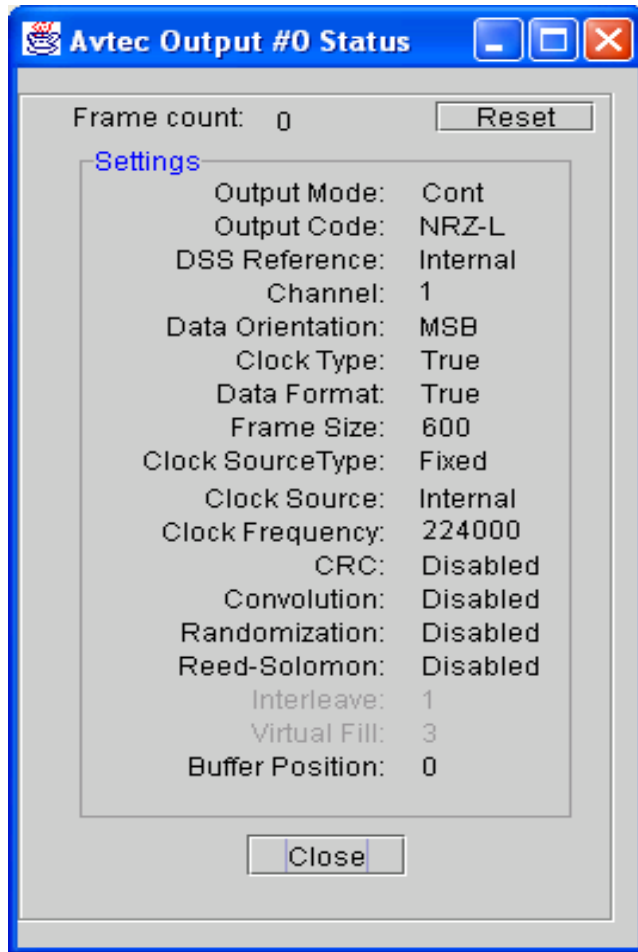
See User's Guide for
additional
Information on these
parameters

AVTEC Serial Output Run Time



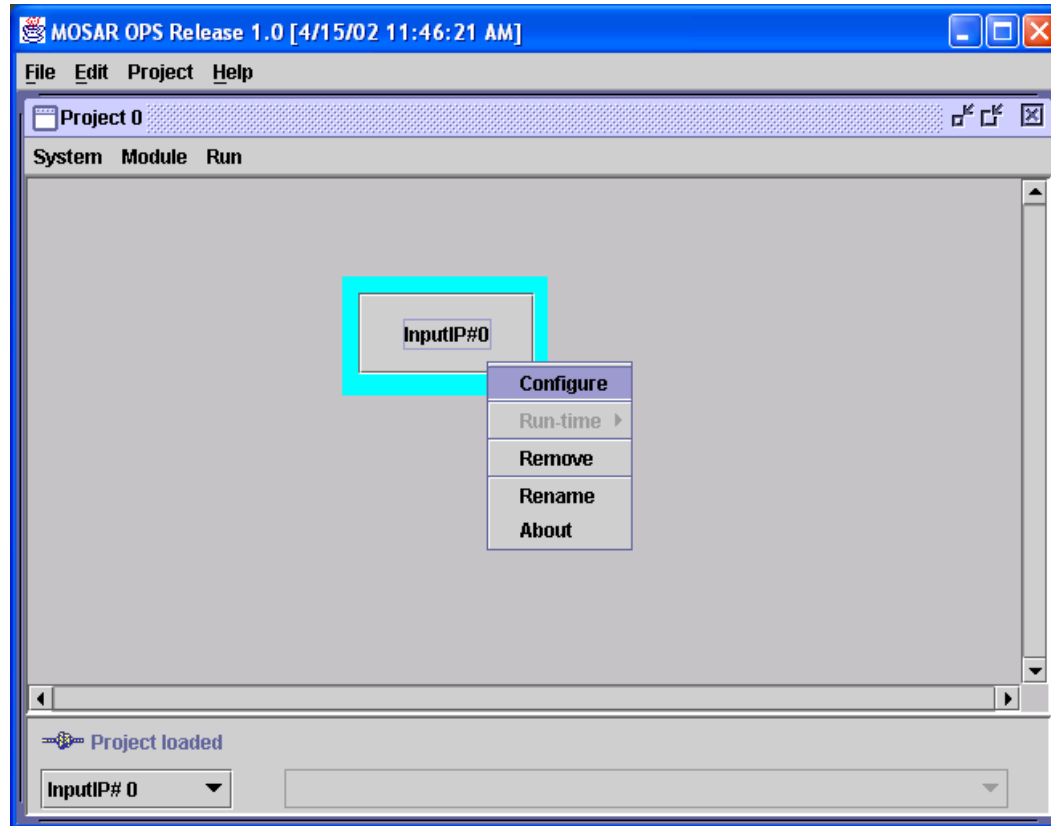
The Run Time Drop Down Windows allow the User to open the Status Window, Display the Raw Data, Stop, or restart the module

AVTEC Serial Output Status Display



This display mainly shows the output configuration. The Frame count indicates the number of buffers that have been transmitted.

Input IP Module



The Input IP Module has no Input Channels and 1 Output Channel

It is a Non-Run Time Configurable Module

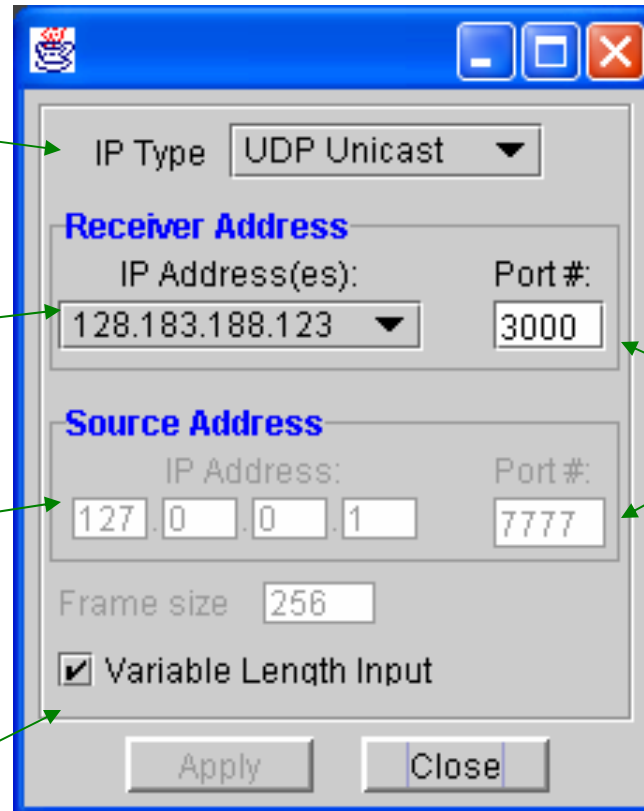
Input IP Configuration

Allows the user to select UDP Unicast, Multicast, TCP Client, and TCP Server

This allows the user to select different Cards if the system has more than one NIC

Address of the machine that is sending the data. This is also where the Multicast Group Address is entered

Selects between Fixed and Variable Length Packets. Usually this will be in Variable

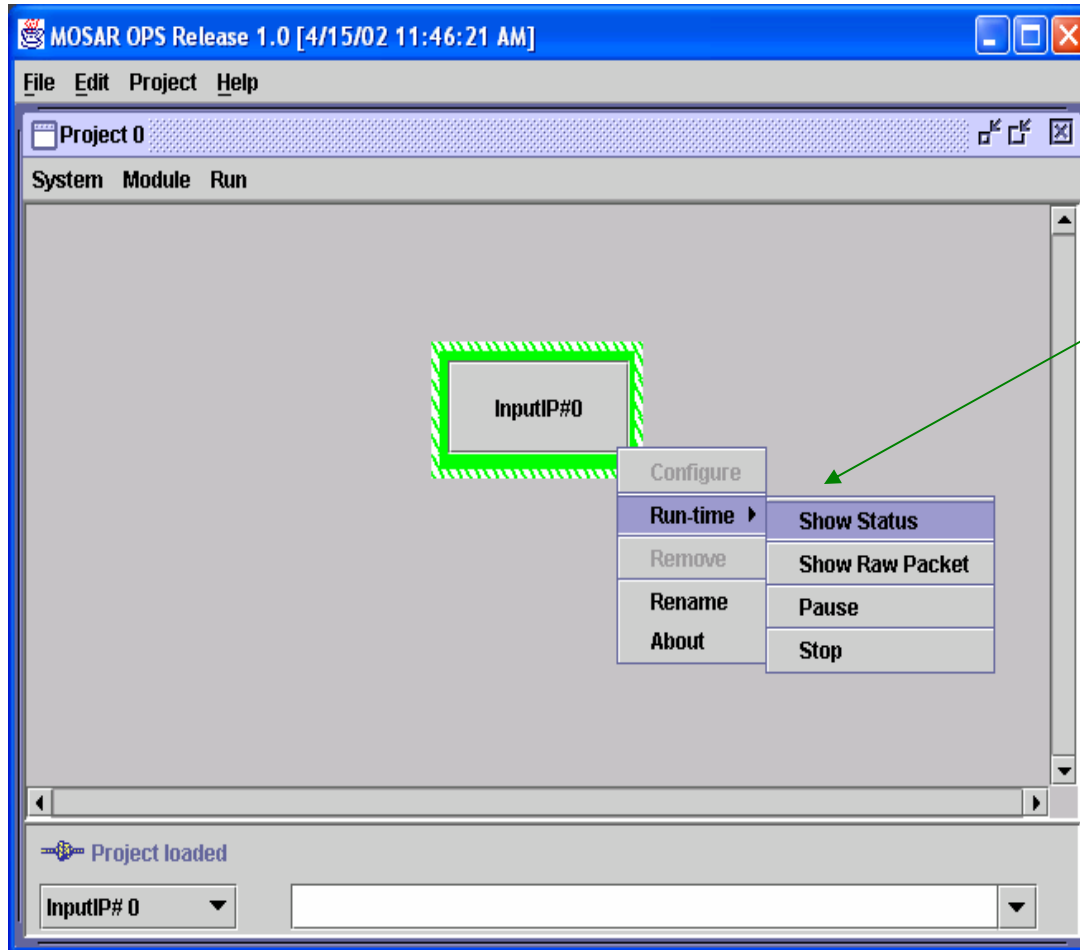


The dialog box is titled "Input IP Configuration" and has a blue title bar with standard Windows window controls. It contains the following fields and controls:

- IP Type:** A dropdown menu currently set to "UDP Unicast".
- Receiver Address:** A section containing:
 - IP Address(es):** A dropdown menu showing "128.183.188.123".
 - Port #:** A text box containing "3000".
- Source Address:** A section containing:
 - IP Address:** Four text boxes containing "127", "0", "0", and "1" respectively, representing the IP 127.0.0.1.
 - Port #:** A text box containing "7777".
- Frame size:** A text box containing "256".
- Variable Length Input:** A checkbox that is checked.
- Buttons:** "Apply" and "Close" buttons at the bottom.

Select the Port #

Input IP Run Time



The Run Time Drop Down Windows allow the User to open the Status Window, Display the Raw Data, Stop, or restart the module

Input IP Status Display

Displays the IP type that was selected

The IP address of the card selected

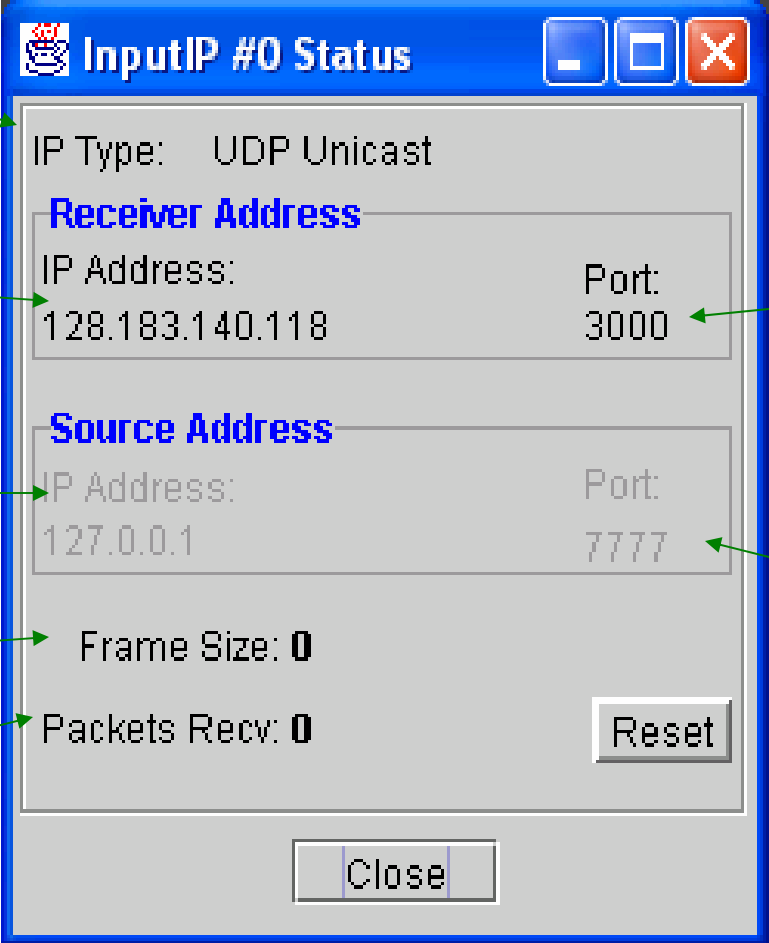
The IP address of the source of the data

Displays the size of the packet

Total Number of Packets Received

Port Assignment

Port Assignment



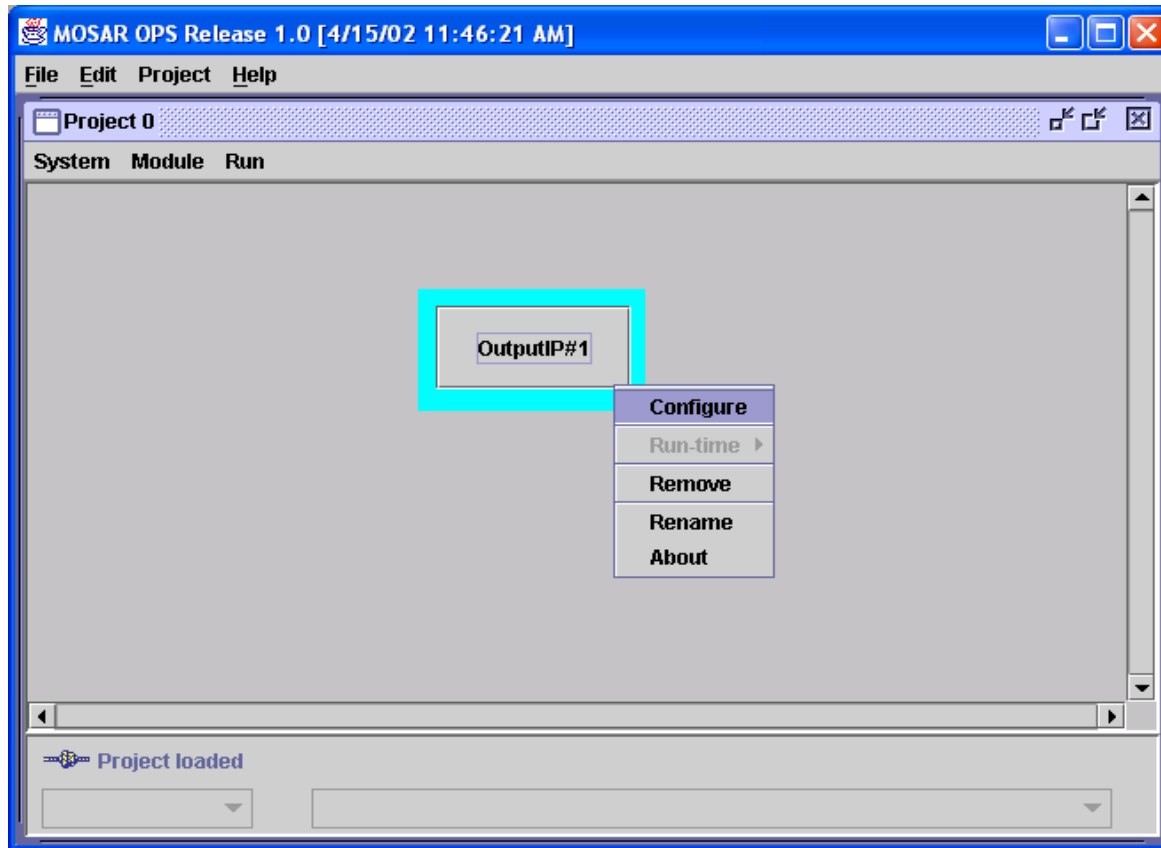
The screenshot shows a window titled "InputIP #0 Status" with a blue title bar and standard Windows window controls. The window content is as follows:

- IP Type: UDP Unicast
- Receiver Address**
 - IP Address: 128.183.140.118
 - Port: 3000
- Source Address**
 - IP Address: 127.0.0.1
 - Port: 7777
- Frame Size: 0
- Packets Recv: 0
- Reset button
- Close button

Green arrows point from the text labels to the corresponding fields in the window:

- From "Displays the IP type that was selected" to "IP Type: UDP Unicast".
- From "The IP address of the card selected" to "IP Address: 128.183.140.118".
- From "The IP address of the source of the data" to "IP Address: 127.0.0.1".
- From "Displays the size of the packet" to "Frame Size: 0".
- From "Total Number of Packets Received" to "Packets Recv: 0".
- From "Port Assignment" to "Port: 3000".
- From "Port Assignment" to "Port: 7777".

Output IP Module



The Output IP Module has 1 Input Channel and no Output Channels

It is a Non-Run Time Configurable Module

Output IP Configuration

Allows the user to select
UPD Unicast, Multicast,
TCP Client , and TCP
Server

This allows the user to select
different Cards if the system
has more that one NIC

Allows the User to
specify the address to
of the machine to send
the data to and also
specify the Multicast
Address

Selects between Fixed and
Variable Length Packets.
Usually this will be in
Variable

OutputIP #1 Confi...

IP Type: UDP Unicast

Sender Address

IP Address(es): 128.183.188.123 Port #: 2001

Destination Address

IP Address: 127.0.0.1 Port #: 7777

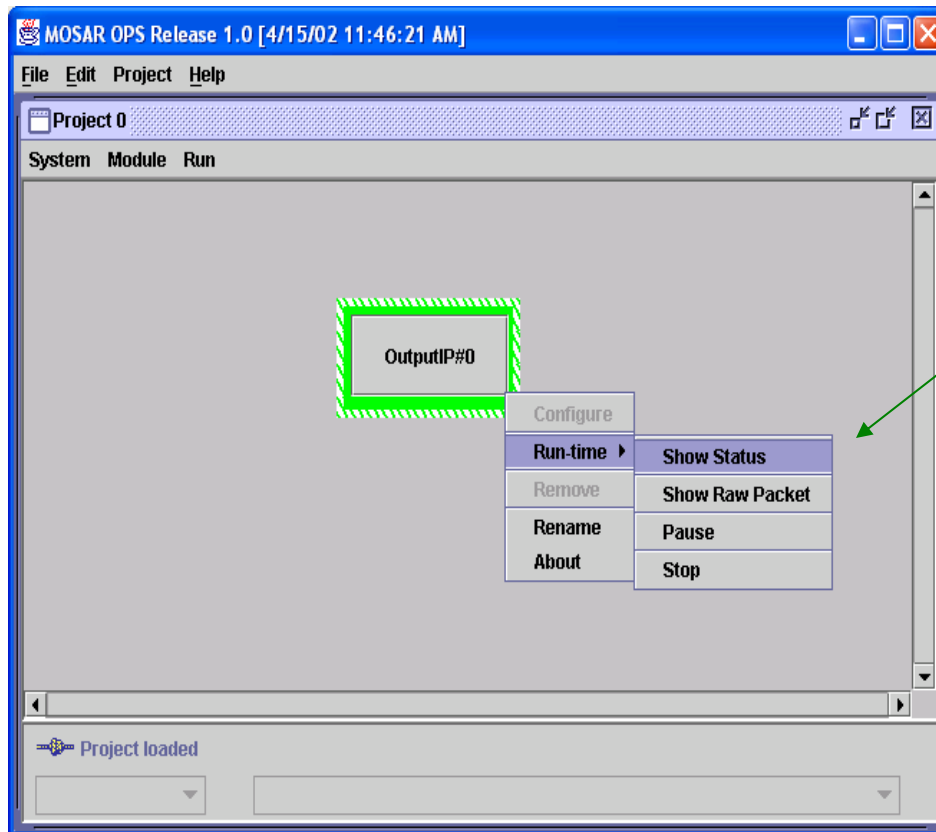
Frame Size: 256

☒ Variable Length Output

Apply Close

Select the
Port #

Output IP Run Time



Use the drop down window to open the status display, raw data display, start, or stop the module

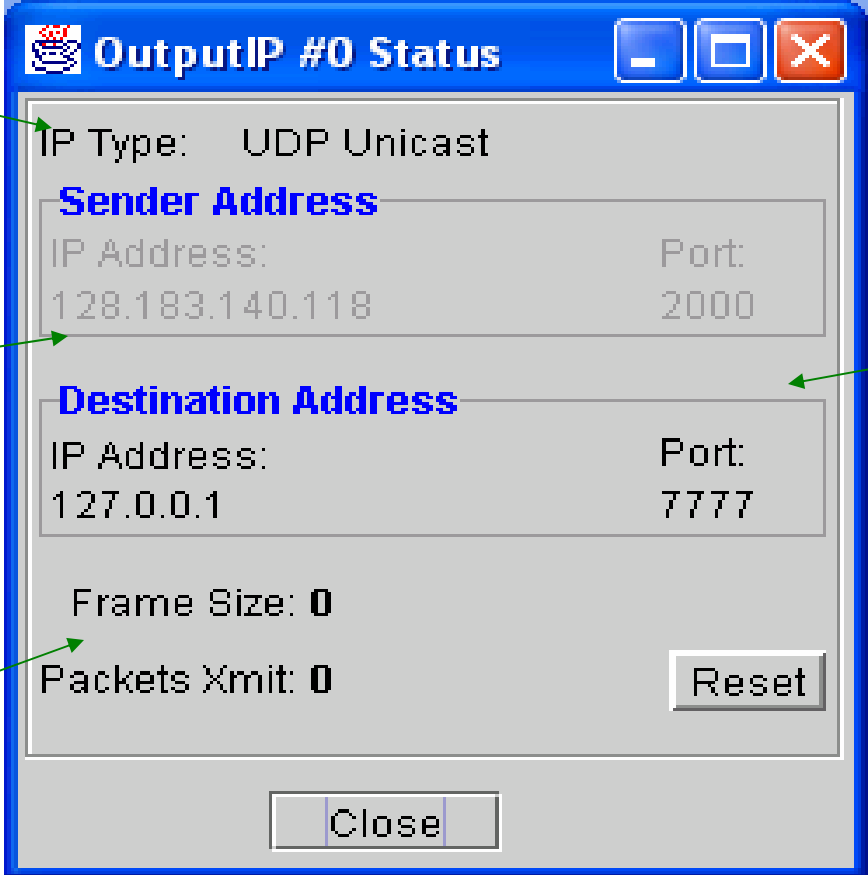
Output IP Status Module

Displays the packet type selected

Displays the IP address selected

Displays the Port selected

Displays the size of the last packet received and the # of packets received

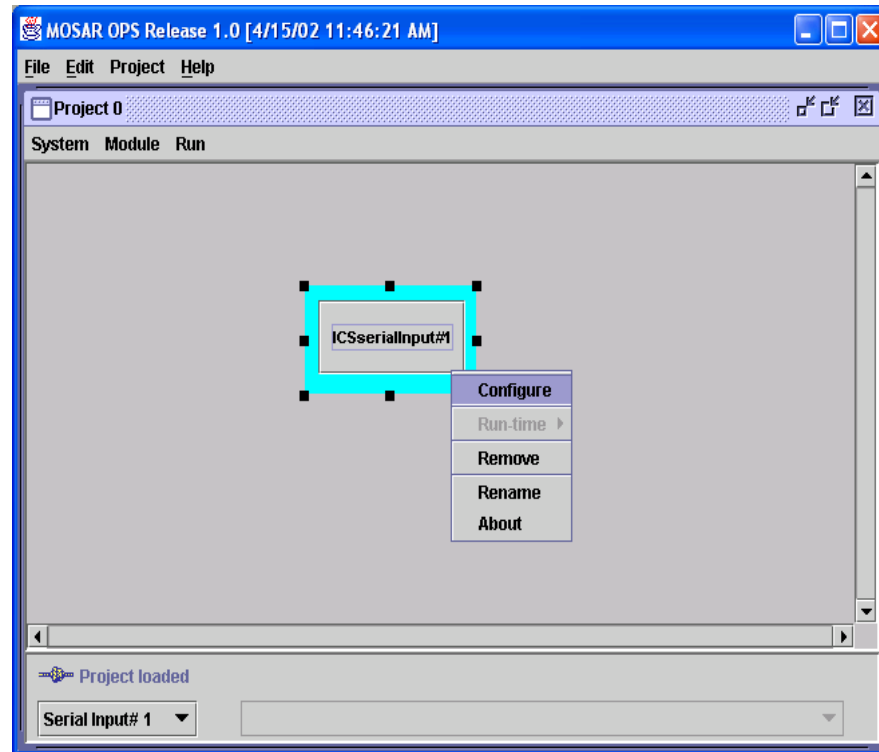


The screenshot shows a Windows-style dialog box titled "OutputIP #0 Status". It contains the following information:

- IP Type:** UDP Unicast
- Sender Address:**
 - IP Address: 128.183.140.118
 - Port: 2000
- Destination Address:**
 - IP Address: 127.0.0.1
 - Port: 7777
- Statistics:**
 - Frame Size: 0
 - Packets Xmit: 0
- Buttons:** "Reset" and "Close".

Green arrows point from the descriptive text to the corresponding fields in the window: from "Displays the packet type selected" to "IP Type"; from "Displays the IP address selected" to the "IP Address" field under "Sender Address"; from "Displays the Port selected" to the "Port" field under "Destination Address"; and from "Displays the size of the last packet received and the # of packets received" to the "Frame Size" and "Packets Xmit" fields.

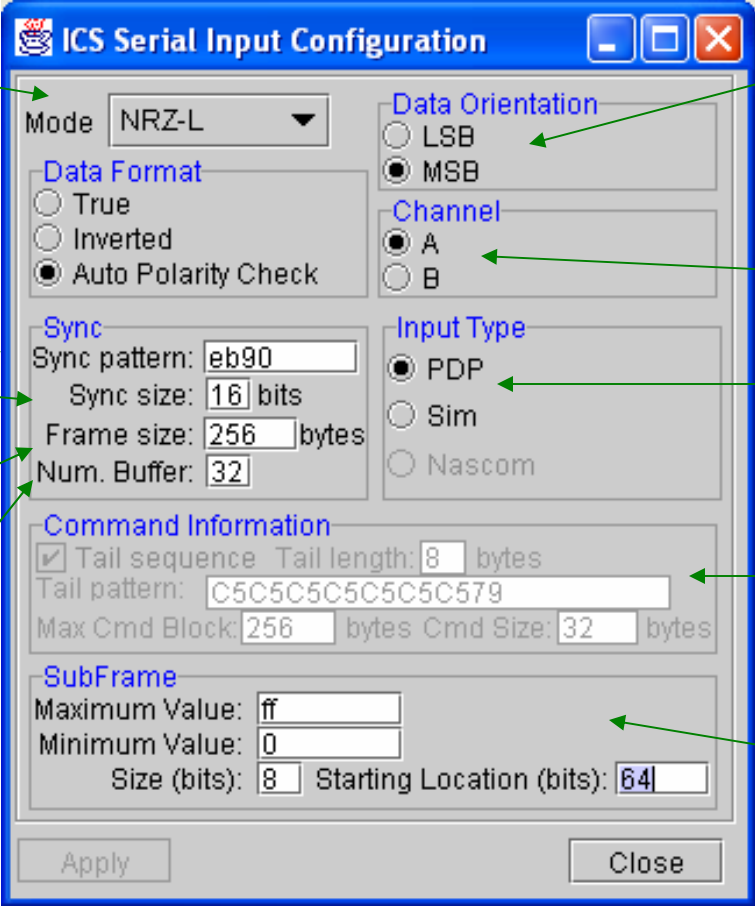
Serial Input Module



Serial Input Module has no Input Channels
and 1 Output Channel

It is a Non-Run Time Configurable Module

Serial Input Module Configuration



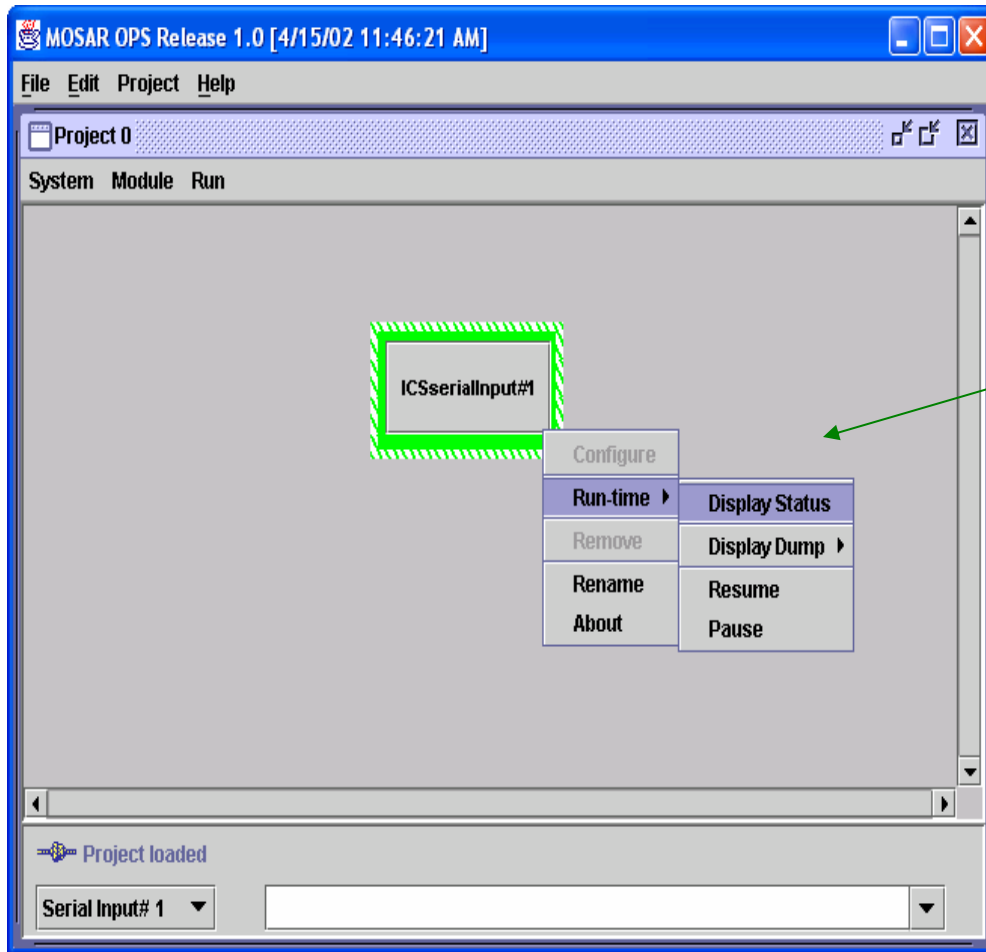
The screenshot shows the 'ICS Serial Input Configuration' dialog box with the following settings and annotations:

- Mode:** NRZ-L (Annotation: Select between NRZ-L, M, or S)
- Data Format:** Auto Polarity Check (Annotation: Select the Polarity of the Data or APC Mode)
- Data Orientation:** MSB (Annotation: Input data in either LSB or MSB mode)
- Channel:** A (Annotation: Select which Card to use)
- Input Type:** PDP (Annotation: PDP is typically used for TLM and SIM for Commands)
- Sync:** Sync pattern: eb90, Sync size: 16 bits, Frame size: 256 bytes, Num. Buffer: 32 (Annotations: Enter the Sync in Hex; Enter the Sync Length in Bits (The module will support 32 bits but 16 is the recommended maximum); Enter the Frame Length 4096 is maximum)
- Command Information:** Tail sequence checked, Tail length: 8 bytes, Tail pattern: C5C5C5C5C5C5C579, Max Cmd Block: 256 bytes, Cmd Size: 32 bytes (Annotation: Setup for Tail Sequence /Postamble Allows for Cmd Size)
- SubFrame:** Maximum Value: ff, Minimum Value: 0, Size (bits): 8, Starting Location (bits): 64 (Annotation: Allows the user to setup for subframe detection.)

Buttons at the bottom: Apply, Close

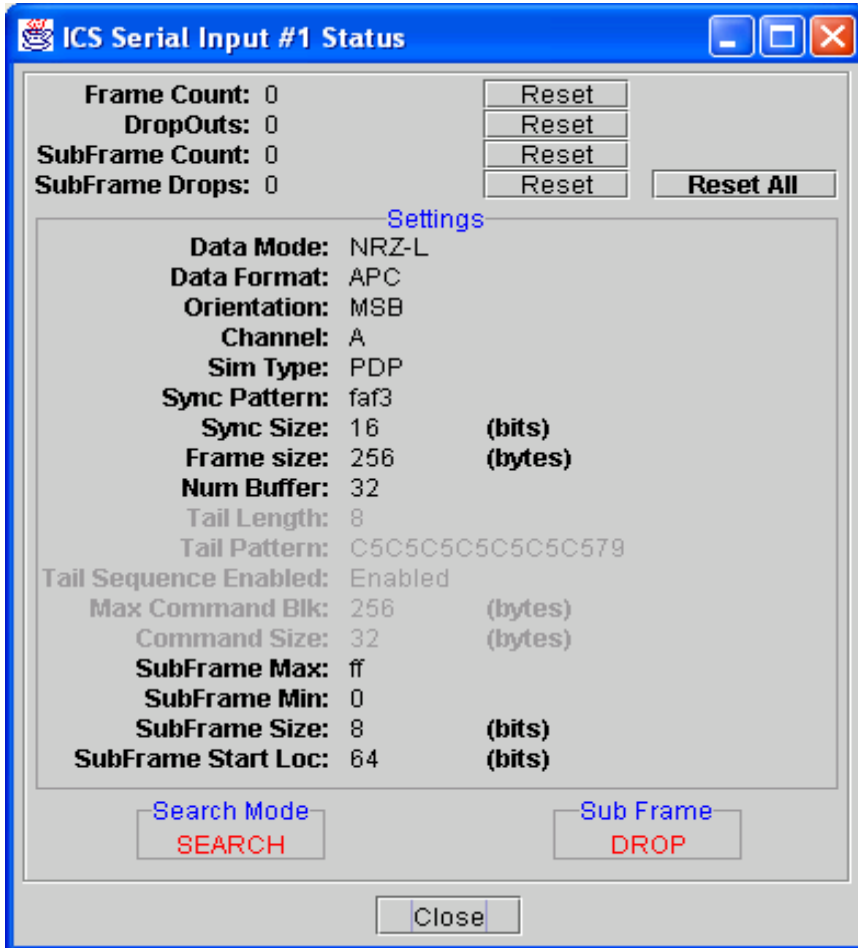
Annotation at the bottom right: Frame Monitor does a better job of this

Serial Input Run Time



The Run Time Drop Down Windows allow the User to open the Status Window, Display the Raw Data, Stop, or restart the module

Serial Input Status

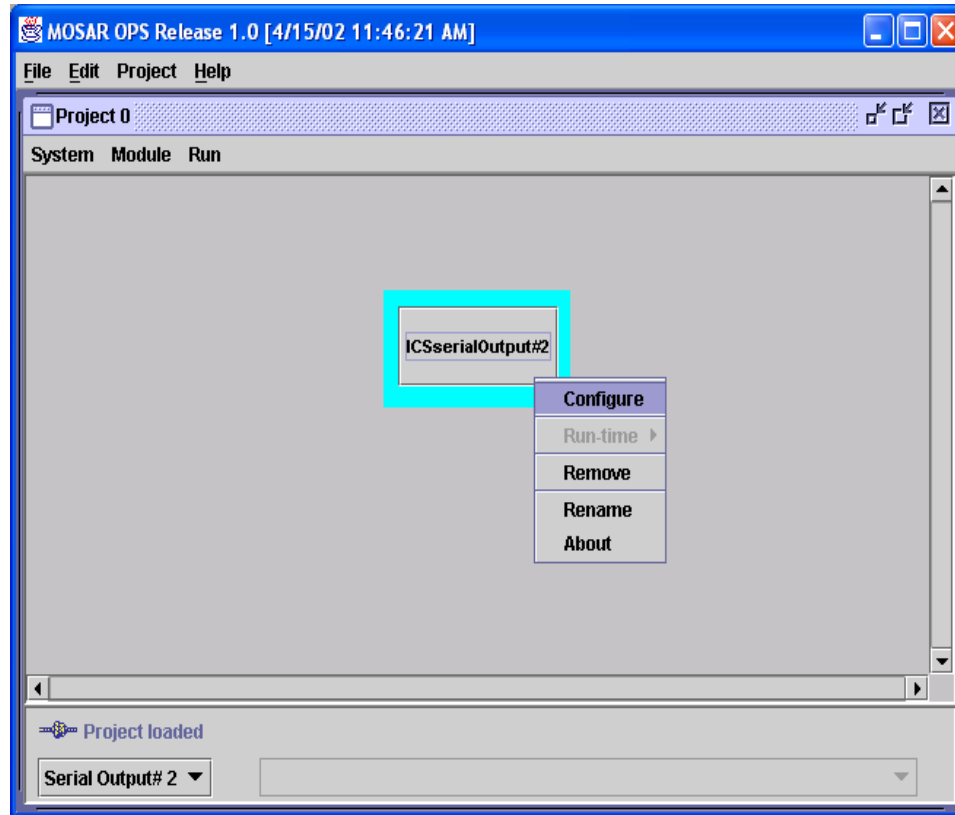


The image shows a software window titled "ICS Serial Input #1 Status". It has a blue title bar with standard Windows window controls (minimize, maximize, close). The window is divided into several sections. At the top left, there are four status labels: "Frame Count: 0", "Drop Outs: 0", "SubFrame Count: 0", and "SubFrame Drops: 0". To the right of these labels are four "Reset" buttons, one for each status. Further right is a "Reset All" button. Below the status labels is a "Settings" section, which is a large gray area containing various configuration parameters. At the bottom of the window, there are two buttons: "Search Mode" (with a red "SEARCH" label) and "Sub Frame" (with a red "DROP" label). A "Close" button is located at the very bottom center.

Parameter	Value	Unit
Frame Count	0	
Drop Outs	0	
SubFrame Count	0	
SubFrame Drops	0	
Data Mode	NRZ-L	
Data Format	APC	
Orientation	MSB	
Channel	A	
Sim Type	PDP	
Sync Pattern	faf3	
Sync Size	16	(bits)
Frame size	256	(bytes)
Num Buffer	32	
Tail Length	8	
Tail Pattern	C5C5C5C5C5C5C579	
Tail Sequence Enabled	Enabled	
Max Command Blk	256	(bytes)
Command Size	32	(bytes)
SubFrame Max	ff	
SubFrame Min	0	
SubFrame Size	8	(bits)
SubFrame Start Loc	64	(bits)

This display mainly shows the output configuration. The Frame count indicates the number of buffers that have been transmitted.

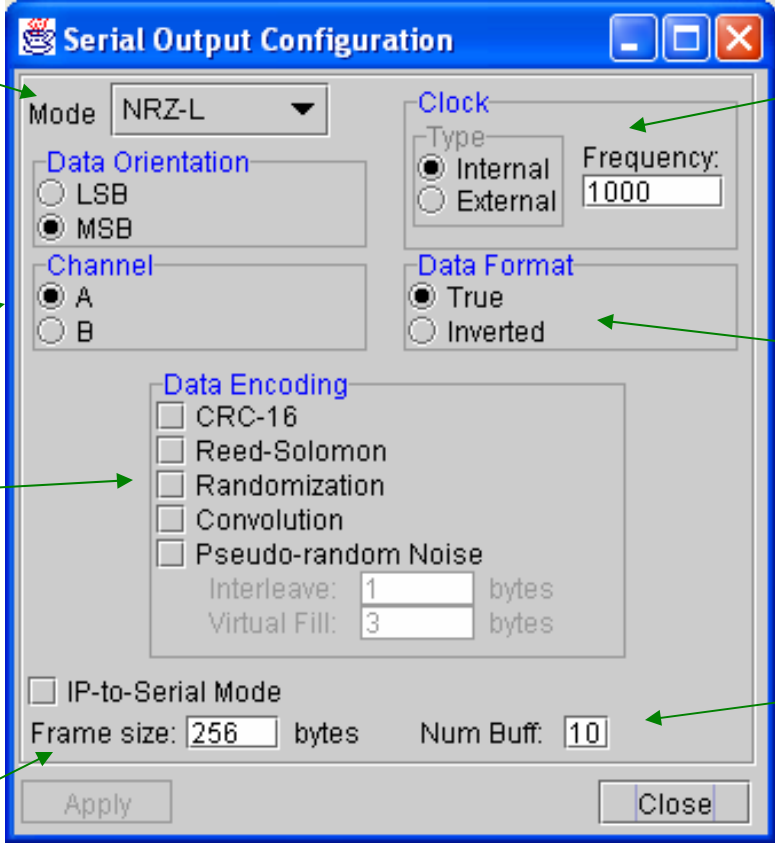
Serial Output Module



Serial Output Module has 1 Input Channel and no Output Channels

It is a Non-Run Time Configurable Module

Serial Output Module Configuration



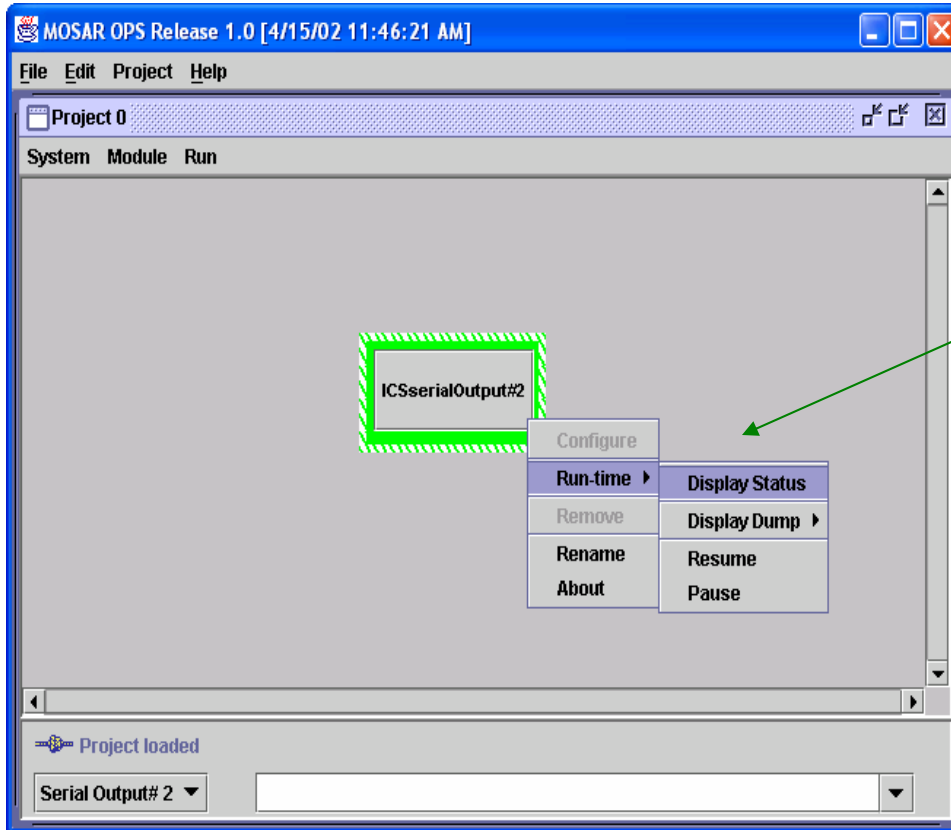
The image shows a 'Serial Output Configuration' dialog box with various settings and annotations. The dialog box has a blue title bar and standard window controls. The settings are organized into several sections: 'Mode', 'Data Orientation', 'Channel', 'Clock', 'Data Format', 'Data Encoding', and 'IP-to-Serial Mode'. Annotations with green arrows point to specific fields and sections, providing additional context for each setting.

Annotations and their corresponding settings:

- Mode:** NRZ-L (Selects NRZ-L,M,S or BIØ- L,M,S for Output)
- Data Orientation:** MSB (Transmit data in MSB or LSB mode)
- Channel:** A (Select the output card to use)
- Clock:** Internal (Select Internal or External Clock source and set the Clock Rate when in Internal. Not all Clock rates are supported.)
Frequency: 1000
- Data Format:** True (Select True or Inverted Data)
- Data Encoding:** CRC-16, Reed-Solomon, Randomization, Convolution, Pseudo-random Noise (See User's Guide for additional Information on these Items)
Interleave: 1 bytes
Virtual Fill: 3 bytes
- IP-to-Serial Mode:** (Allows for some buffering of data)
- Frame size:** 256 bytes (Must be set to the size of the packet transmitted from the previous module)
- Num Buff:** 10 (Number of software buffers to use.)

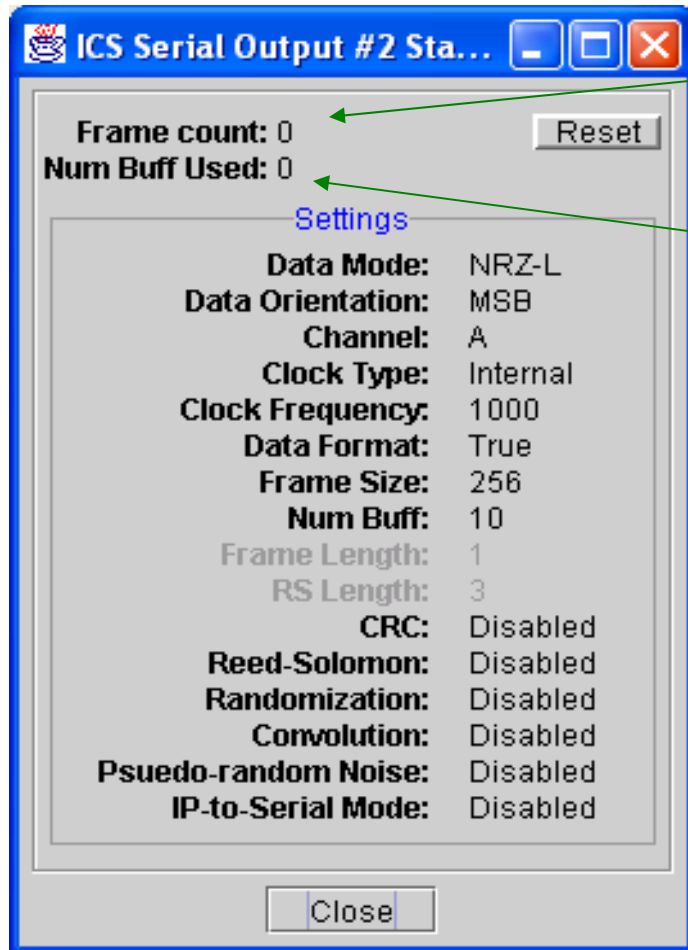
Buttons: Apply, Close

Serial Output Run Time



The Run Time Drop Down Windows allow the User to open the Status Window, Display the Raw Data, Stop, or restart the module

Serial Output Status



The Frame count indicates the number of buffers that have been transmitted.

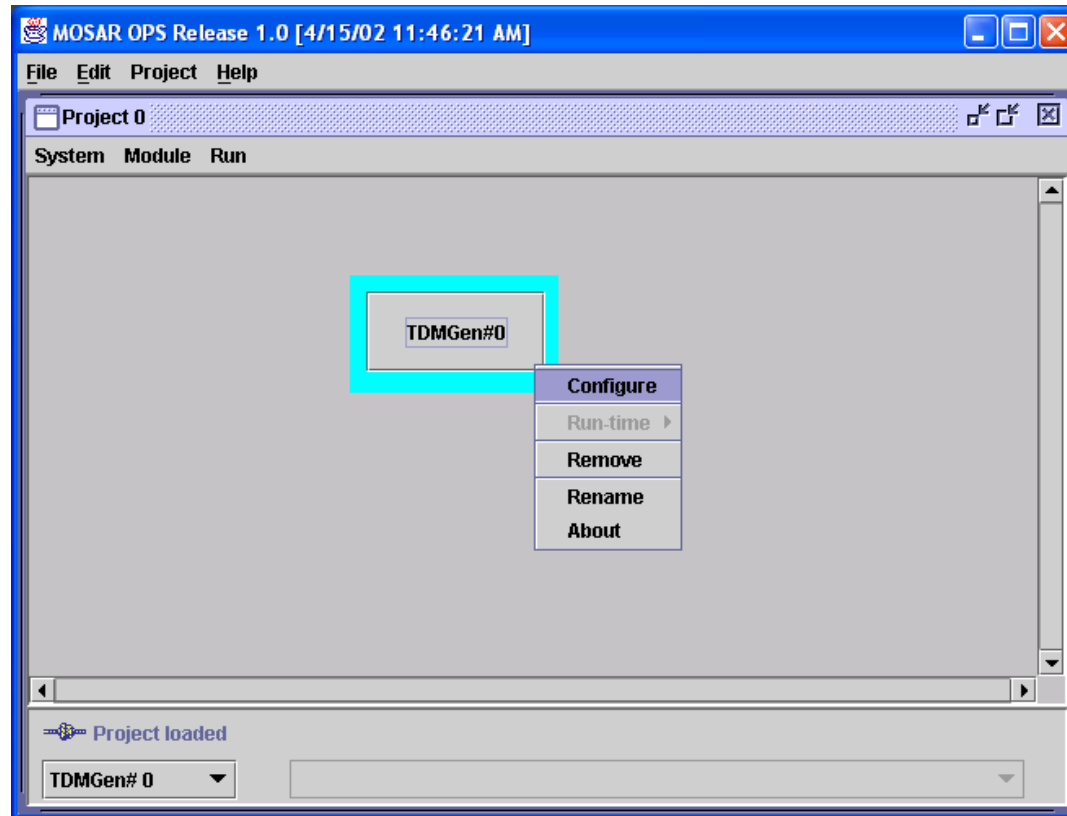
Number of Buffers used indicates how many buffers are in the Queue.

This display mainly shows the output configuration.

Data Generation Modules

- The following modules are used to generate data.
 - TDMGEN
 - TDMCMDGEN
 - GENTLM
 - CMDXMIT
 - JSC Voice Pattern

TDMGEN



TDMGEN has 3 Input Channels and 1 Output Channel

It is a Non-Run Time Configurable Module

TDMGEN

Frame Length
Maximum is
4096

Minor Frames per
Major Frame
(Decimal Value)

Inserts the Byte Number
Allows the User to enter
a pattern

Load a major frame
from disk

Load or Save a
Configuration File

The screenshot shows the 'TDMGen Configuration' window. It has a blue title bar and standard Windows window controls. The main area is divided into several sections:

- Frame Size (bytes):** A text box containing '0'. A green arrow points to it from the text 'Frame Length Maximum is 4096'.
- # Minor Frames/Major Frame:** A text box containing '0'. A green arrow points to it from the text '# Minor Frames per Major Frame (Decimal Value)'.
- Template:** A section with a 'File Name:' text box. A green arrow points to it from the text 'Inserts the Byte Number Allows the User to enter a pattern'.
- Fill Bytes:** A section with three radio buttons: 'Incremental' (selected), 'Pattern' (with a text box containing '0'), and 'Major Frame Template'. A green arrow points to the 'Pattern' option from the same text as the previous arrow.
- Include CRC:** A checkbox that is currently unchecked.
- Number of Bits:** A section with two radio buttons: '16 bits' and '32 bits' (selected). A green arrow points to the '32 bits' option from the text 'Load a major frame from disk'.
- Init Value:** A text box containing '0'.
- Polynomial:** A text box containing '10210000'.
- Buttons:** 'Load From File' and 'Save To File' are located below the 'Number of Bits' section. A green arrow points to both from the text 'Load or Save a Configuration File'.
- Basic Counters:** A section on the right with 'Add', 'Modify', and 'Delete' buttons. A green arrow points to the 'Add' button from the text 'Allows the User to Add, Modify, or Delete a counter in the data stream'.
- Fixed Values:** A section on the right with 'Add', 'Modify', and 'Delete' buttons. A green arrow points to the 'Add' button from the text 'Allows the User to Add, Modify, or Delete a fixed value in the data stream'.
- External Data Stream:** A section on the right with 'Add', 'Modify', and 'Delete' buttons. A green arrow points to the 'Add' button from the text 'Allows for insertion of an external data stream into the output stream'.
- Footer:** 'Apply' and 'Close' buttons are at the bottom.

Allows the User
to Add, Modify,
or Delete a
counter in the
data stream

Allows the User to
Add, Modify, or
Delete a fixed
value in the data
stream

Allows for
insertion of an
external data
stream into the
output stream

TDMGEN Basic Counter Window

Provide a Name to the Counter

This value is transferred from the main configuration window

Major Frame Counter Setup

Use this to setup minor frame counters. The Frame starts with byte 0, so if you have 24 bits of sync and then the subframe counter the start byte would be 3

The screenshot shows a Windows-style dialog box titled "TDMGEN Modify Basic Counter". It contains two main sections for configuring major and minor frame counters. The "Name" field is set to "Basic Counter 0". The "# Minor/Major" field is set to "0". The "Include Major Counter" and "Include Minor Counter" checkboxes are both unchecked. The "Major Frame Counter Setup" section includes fields for "Start Byte" (0000), "Size" (0000 bytes), "Increment" (1), and "Start Value" (0000). The "Minor Frame Counter Setup" section includes fields for "Start Byte" (0000), "Size" (0000 bytes), "Increment" (1), and "Start Value" (0000). Both sections also have "Subcom" checkboxes and "Starting Frame" (0) and "Depth" (0) fields. "Apply" and "Close" buttons are at the bottom.

Field	Value
Name	Basic Counter 0
# Minor/Major	0
Include Major Counter	<input type="checkbox"/>
Include Minor Counter	<input type="checkbox"/>
Start Byte (Major)	0000
Size (Major)	0000 bytes
Increment (Major)	1
Start Value (Major)	0000
Start Byte (Minor)	0000
Size (Minor)	0000 bytes
Increment (Minor)	1
Start Value (Minor)	0000
Subcom (Major)	<input type="checkbox"/>
Subcom (Minor)	<input type="checkbox"/>
Starting Frame (Major)	0
Depth (Major)	0
Starting Frame (Minor)	0
Depth (Minor)	0

This window appears when the Modify button is selected for the Basic Counter

Modify Fixed Value Window

Provide a name
to the value

Start Byte in
the Frame

Enter the
values in
Hex

The screenshot shows a Windows-style dialog box titled "TDMGEN Modify Fixed Value". It contains several input fields and a large grid for hex values. Annotations with green arrows point to specific parts of the dialog:

- An arrow points to the "Name:" text box, which contains "Fixed Value 0".
- An arrow points to the "Start Byte:" text box, which contains "0000".
- An arrow points to the "Value" section, specifically to the first cell of the hex grid, which contains "00".

Other visible elements include:

- A "Subcom" checkbox (unchecked).
- "Starting Frame:" and "Depth:" text boxes, both containing "0".
- A "Size: 0 bytes" label and an "Insert" button.
- A grid of 8 rows and 16 columns of hex value boxes, all containing "00".
- "Apply" and "Close" buttons at the bottom.

Use this to insert
the data in only
certain locations

Starting frame is
the first frame the
data is to be
inserted

Depth determines
how many minor
frames to insert
the data into

External Data Stream Configuration

Provide a Name to
the Data Stream

Select the
Input Channel
to use

Where to insert the
data

Number of
Bytes to Insert

Use to define
subcoms to
insert data

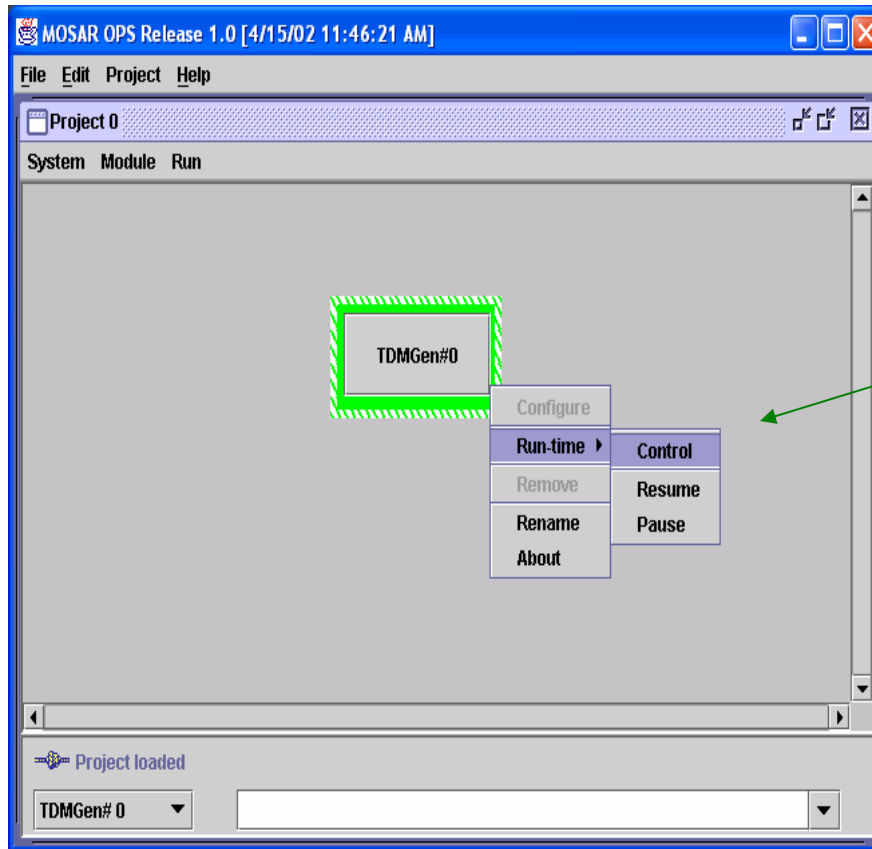
The screenshot shows a Windows-style dialog box titled "TDMGEN External Data Stream Config". It contains several input fields and a checkbox. Green arrows point from descriptive text on the left to specific fields in the dialog:

- An arrow points from "Provide a Name to the Data Stream" to the "Name" field, which contains "Data Stream 0".
- An arrow points from "Select the Input Channel to use" to the "Input Channel" field, which contains "1".
- An arrow points from "Where to insert the data" to the "Start Byte" field, which contains "0000".
- An arrow points from "Number of Bytes to Insert" to the "Size" field, which contains "0000" followed by the text "bytes".
- An arrow points from "Use to define subcoms to insert data" to the "Subcom" checkbox, which is currently unchecked.

Below the "Subcom" checkbox is a group box containing two fields: "Starting Frame" with value "0" and "Depth" with value "0". At the bottom of the dialog are "Apply" and "Close" buttons.

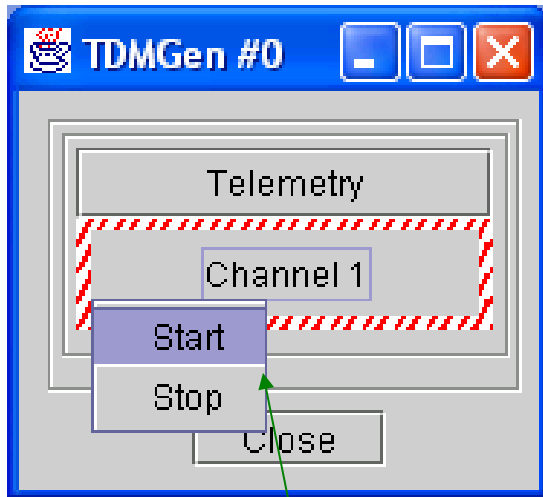
This window appears when the modify External Data Stream is
clicked

TDMGEN Run Time

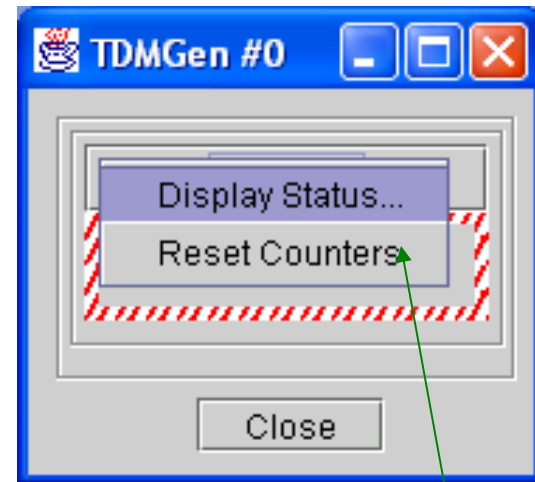


Use this drop down to
open the Control
Window

TDMGEN Control Window

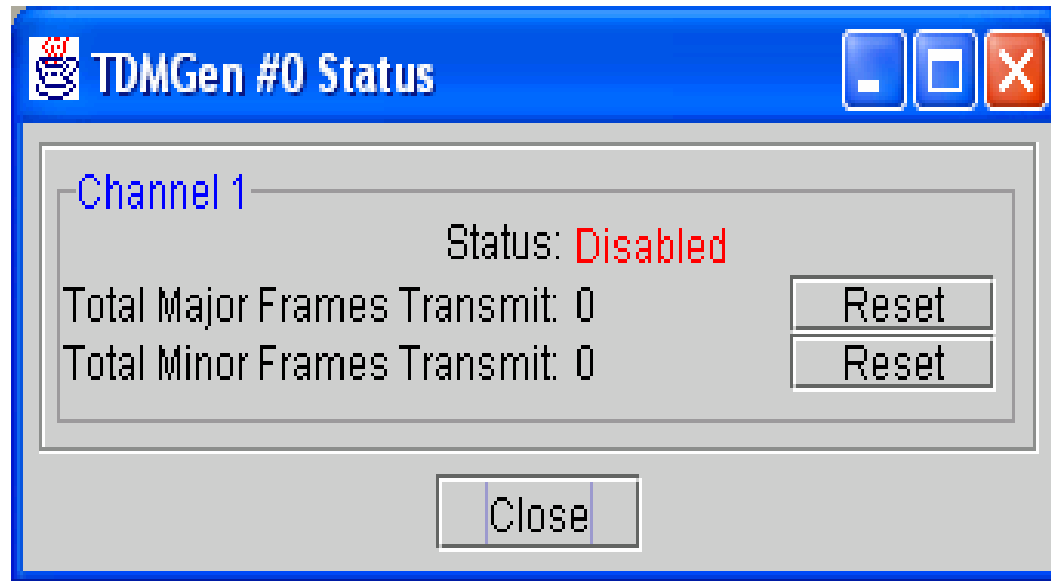


Clicking on the Channel 1 Box will open this drop down. This will allow the user to start or stop the data. When the data is running the outline of the box will turn to green.



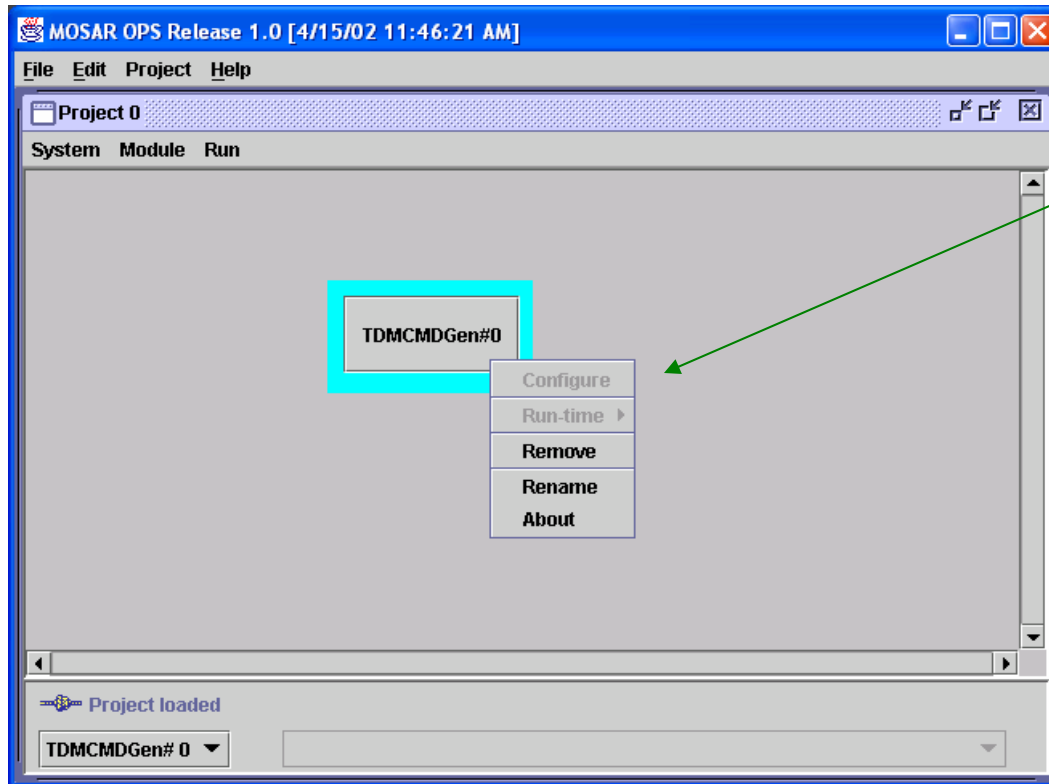
Clicking on Telemetry will allow the user to open the status display or reset the counters

TDMGEN Status Display



This displays allows the user to verify the status of the stream and the number of frames transmitted.

TDMCmdGen

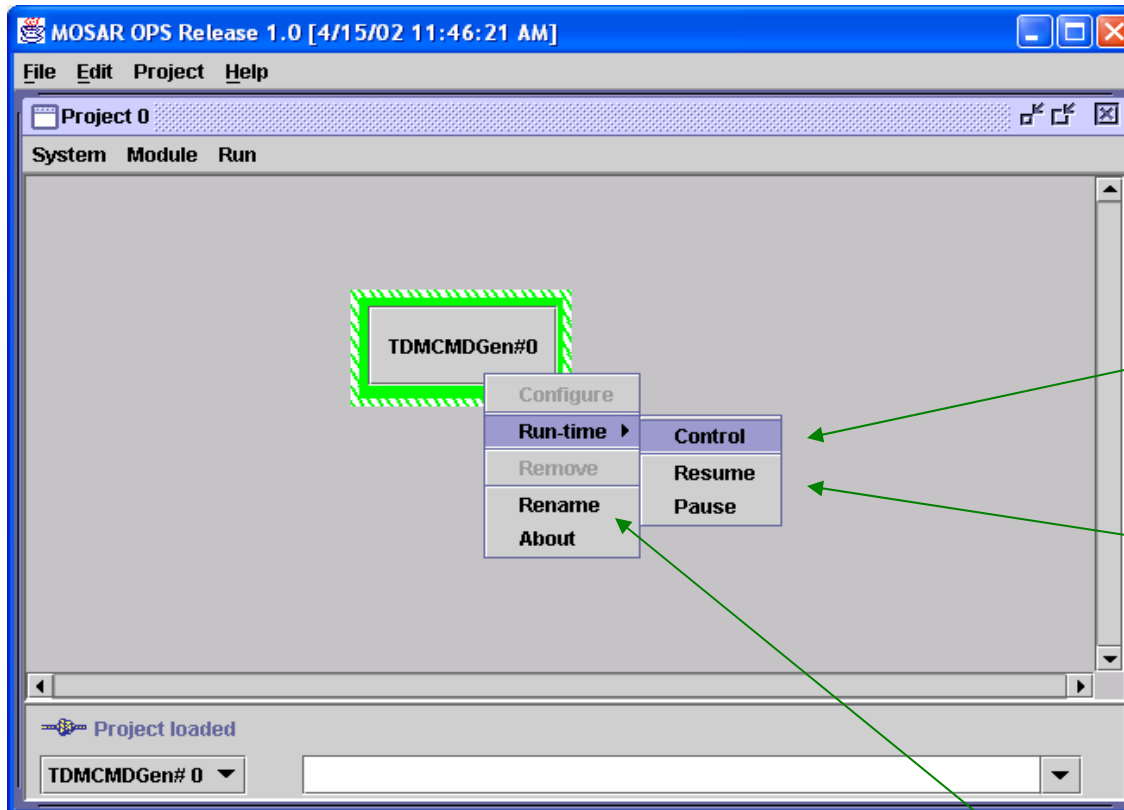


Configure is "Grayed" out. This indicates that this module can not be configured in this mode

TDMCmdGen has no Input Channels and 1 Output Channel

It is a Run Time Configurable Module

TDMCmdGen



To configure the module to send a command you must select **Run Time** and then select **Control**

Pause and Resume can be selected to stop or start the module

Clicking here allows the user to Specify a new name for the module

TDMCMDGEN

Specify Preamble Length and Pattern

Specify Barker or S/C Sync

Specify Postamble Length and Pattern

Perform the Encoding

Allows the user to Load or Save Configurations

Allows the User to set up commands

Allows the user to transmit the command a specified number of times and at a specified interval. If # Xmits = 0 it will send until stopped

Used to send the sequence or to stop the sequence

TDMCMDGen #1 TDMCMDGen Control

☐ Preamble
Pattern: 0
Repeat For: 0 Bytes

☐ Barker Code
Pattern: 0

☐ Secondary Barker Code
Pattern: 0

☐ Postamble
Pattern: 0
Repeat For: 0 Bytes

☐ Hamming Encoding
Init Value: 0
Polynomial: c5

Load Seq
Save Seq

Insert
Delete
Edit
Clear List
Copy

☐ Repeat Xmit
Xmits: 0
Interval: 0 ms
Apply

Status
Not Sending
Transmitted: 0
Reset

Send Seq
Stop Seq

Apply
Close

Editing a Command

Provide a name to the command

Insert the command in Hex

TDMCMDGen #0 TDMCMDGen Enter CMD

Name:

Value

Size: 0 bytes

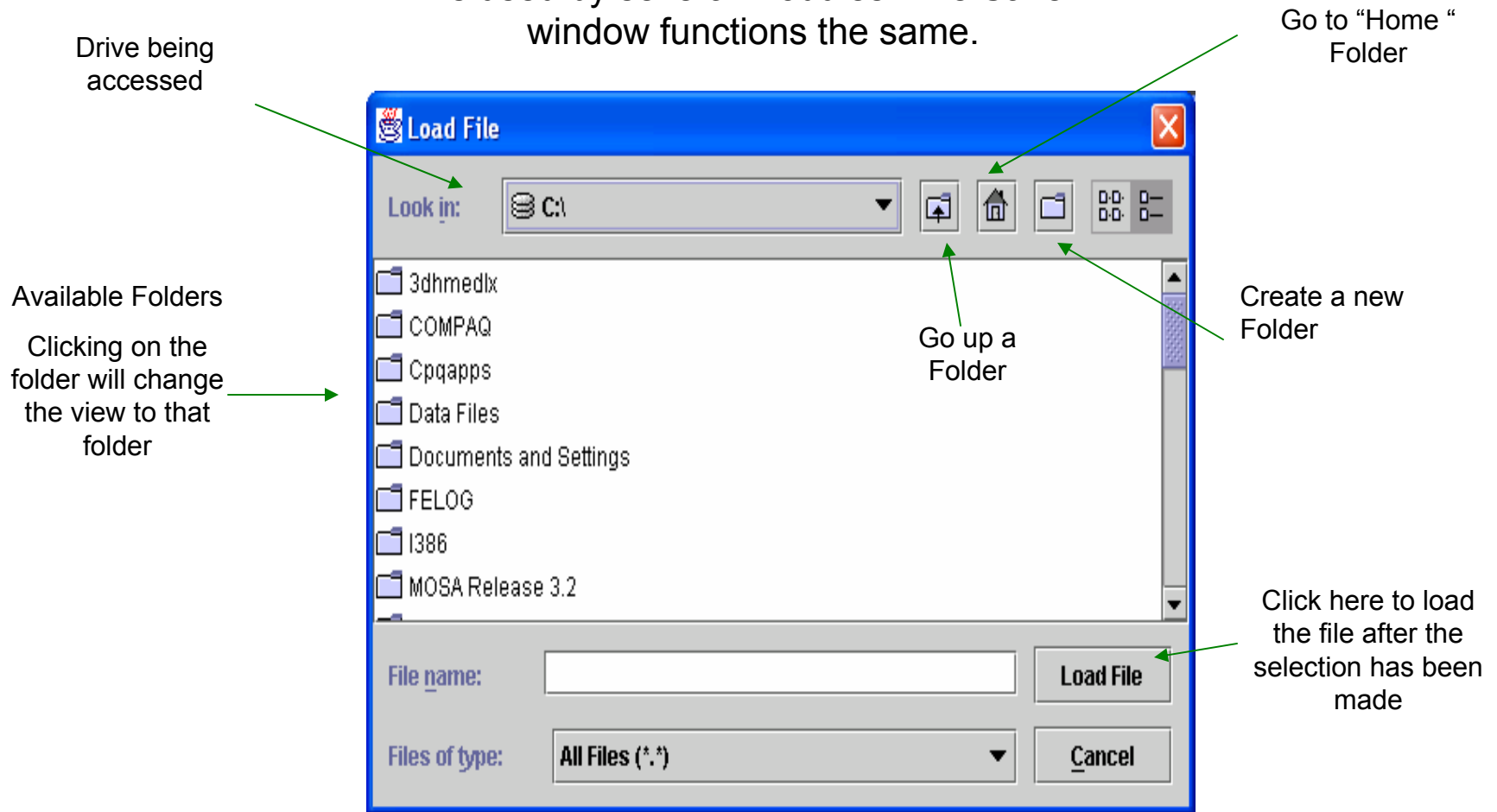
00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00

This window appears when the Edit button is clicked

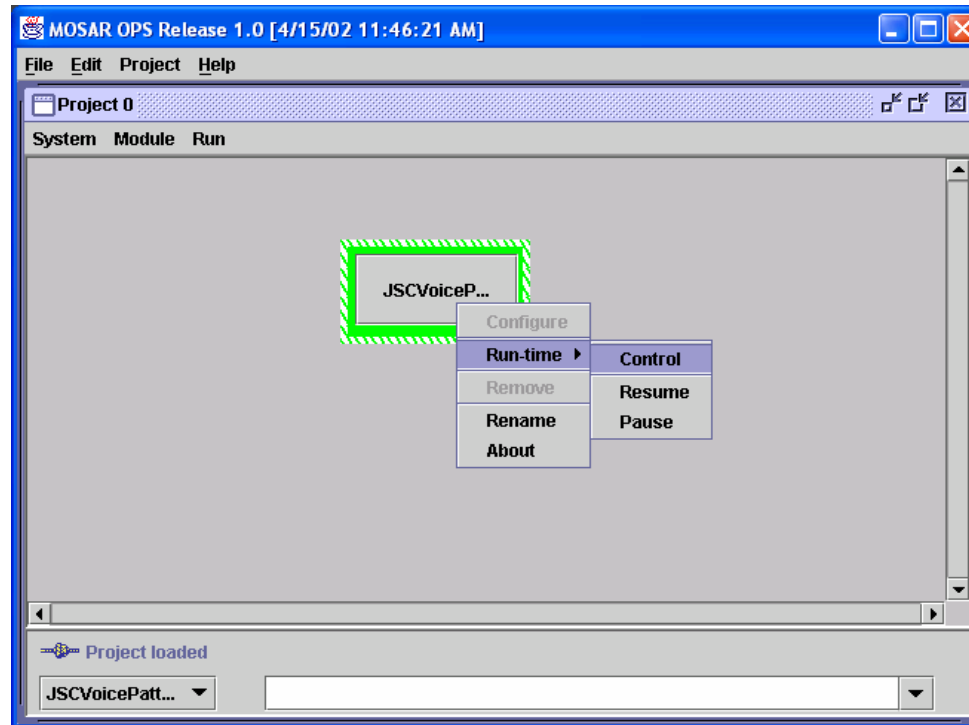
Use these buttons to save or restore a command

TDMCmdGen Load /Save

This is the generic JAVA file browser. This is used by several modules. The Save window functions the same.



JSC Voice Pattern



JSC Voice Pattern Module has no Input Channels and 1 Output Channel

It is a Run Time configurable module.

JSC Voice Pattern

Select either the High or Low rate

Select the pattern to insert in the voice words

JSCVoicePattern #4 Control

Uplink Bitrate

☐ Low Rate 32 kbps

☒ High Rate 72 kbps

Voice Channel One

☒ Quiet Tone AAAA AAAA AAAA AAAA

☐ Low Tone FFFF FFFF 0000 0000

☐ High Tone FFFF 0000 FFFF 0000

☐ User Defined Tone FF00FFFF000000FF

Voice Channel Two

☒ Quiet Tone AAAA AAAA AAAA AAAA

☐ Low Tone FFFF FFFF 0000 0000

☐ High Tone FFFF 0000 FFFF 0000

☐ User Defined Tone 00FFFFFF0000FF00

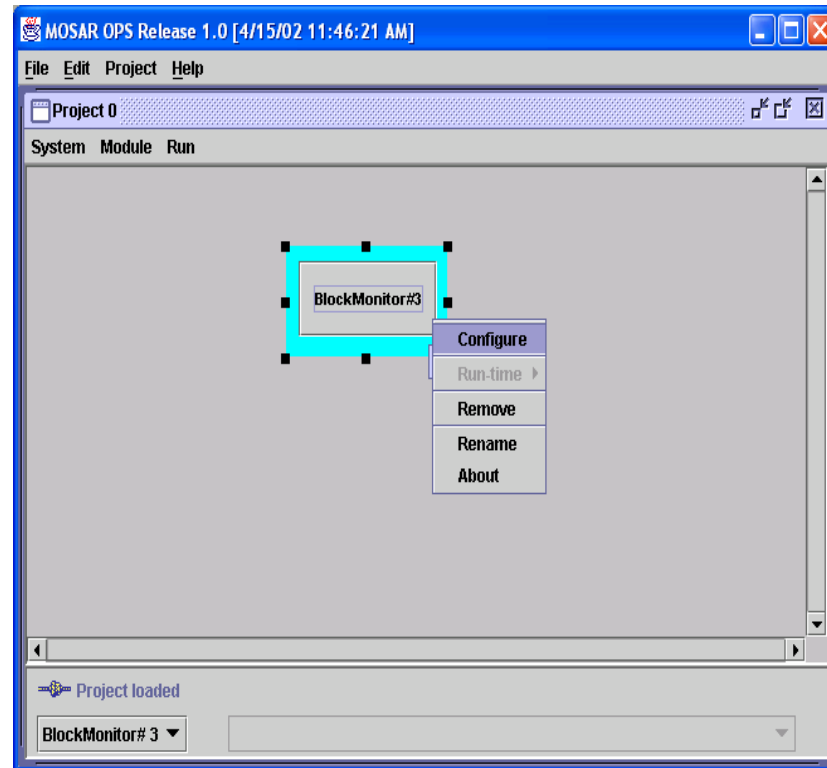
Apply Close

Data Evaluation Class

(Note: some of these modules may also fall into other classes)

- Block Monitor
- Frame Monitor
- Frame Monitor Shuttle
- Generic Command Ingest
- Generic Command Validation
- NASCOM Monitor
- Monitor
- Packet Processor
- Shuttle Command Echo
- Site Status
- TDRSS Checksum
- Track Monitor
- TDM Cmd Ingest
- TDM DQM
- VC Processor

Block Monitor



Block Monitor has 1 Input Channel and 3 Output Channels

It is a Run Time Configurable module but it can also be configured while the module is stopped.

Block Monitor Output Channels

- Channel 1
 - The Data Field is extracted from the block and sent out of Channel 1. This essentially makes this a De-Blocked Output.
- Channel 2
 - 4800 NASCOM Block data. The Block monitor can filter on several header items
- Channel 3
 - This channel outputs the contents of the data field but the Block Time, Source, and Destination are added to the beginning of the output packet. This information is used by Frame Monitor and Frame Monitor Shuttle.
- The selection of channels is made when the link is made from the Block Monitor to the next module.

Block Monitor Configuration

The screenshot shows the 'BlockMonitor#0 Config' window. The title bar includes a logo, the text 'BlockMonitor#0 Config', and standard window controls. The main area is titled 'Block Monitor Configuration' and contains several sections of controls. Annotations with green arrows point to specific elements: one group of arrows points to 'Bits/Sec:', 'Delta T Exp (µs):', 'DT Variance (µs):', and 'DT Variance (%)'; another points to the 'SrcID:' field; a third points to the 'Nascom Header:' dropdown menu; a fourth points to the 'Over Write Header-Time' checkbox; a fifth points to the 'Select PDF' button; a sixth points to the 'Statistic File Flag' checkbox; and a seventh points to the 'Statistic File' text box. The window also features 'Apply' and 'Close' buttons at the bottom.

Used to calculate the Block Delta Time

Allows the user to specify items to use to filter blocks. You can use 1 or any combination of the items

Select stored configurations from the database

Allows the user to create a text file of error events

Where you see this it indicates a drop down window. In this case this is linked to the database for Source/Destination Codes

Allows the user to overwrite the Block Time with the current system time. The new time is in the block output on Channel 2

Allows the user to select different databases

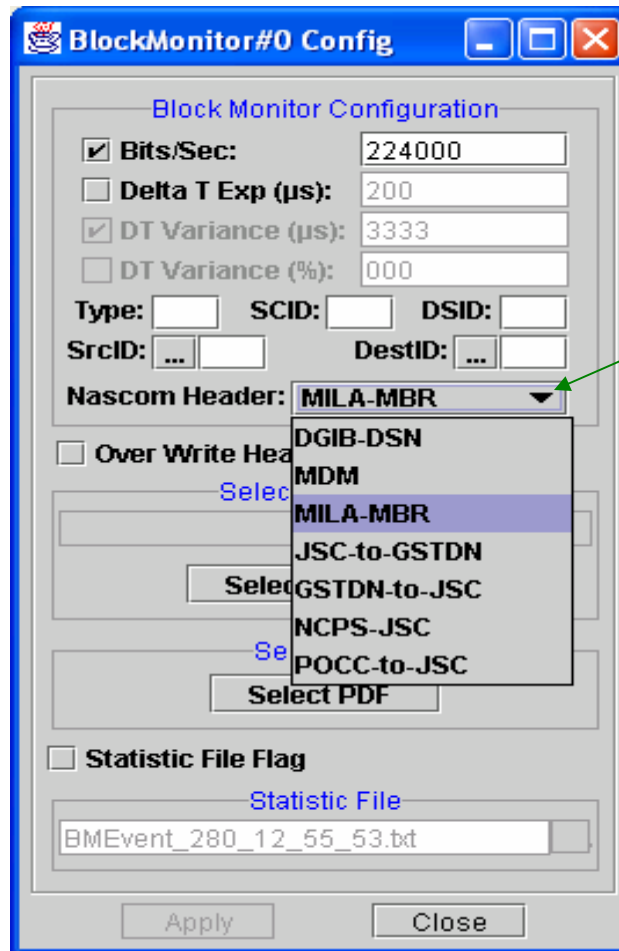
BlockMonitor#0 Config

Block Monitor Configuration

- ☒ **Bits/Sec:** 224000
- ☐ **Delta T Exp (µs):** 200
- ☒ **DT Variance (µs):** 3333
- ☐ **DT Variance (%):** 000
- Type:** **SCID:** **DSID:**
- SrcID:** **DestID:**
- Nascom Header:** MILA-MBR
- ☐ **Over Write Header-Time**
- Select Database**
- Select PDF**
- ☐ **Statistic File Flag**
- Statistic File**
BMEvent_280_12_55_53.txt

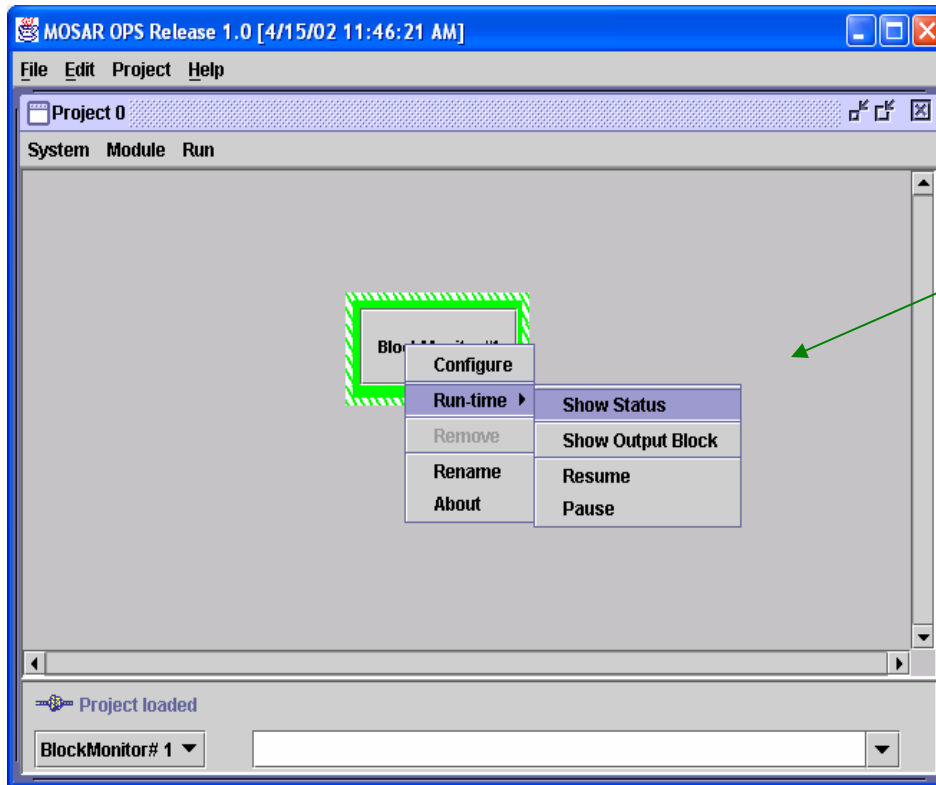
Apply Close

Selecting a Block Type



Selecting this Drop Down allows the user to select the desired Block Type

Block monitor Run Time



Use the drop down menu to open the status and raw data display.

Block Monitor Status Display

Displays the System time and the time from the block header

of bits per second received

Size of the block in bytes

Displays the block status.

of Blocks per Second

Octal displays of block header

Calculated Block Delta Time

Displays previous 4 events and time

The screenshot shows the 'BlockMonitor#0 Status' window with the following sections and values:

- Time & Page:** Display Time: 280:13:04:56.235, Block Time: (blank)
- Block Header:** Block/Sec: (blank), Bits/Sec: 0, Block Size: 0
- Block Status:** Blocks Accepted: 0, PEP Err: 0, Delta Time Err: 0, Sequence Err: 0, Missed Block: 0
- Nascom Sync Error:** 0 Bit: 0, 1 Bit: 0, 2 Bit: 0, 3 Bit: 0
- Delta Time (µs):** Expected: 0, Actual: 0, Variance: 0
- Event Status:** 280:13:04:36.226 Module runs

Annotations with arrows point to the following elements:

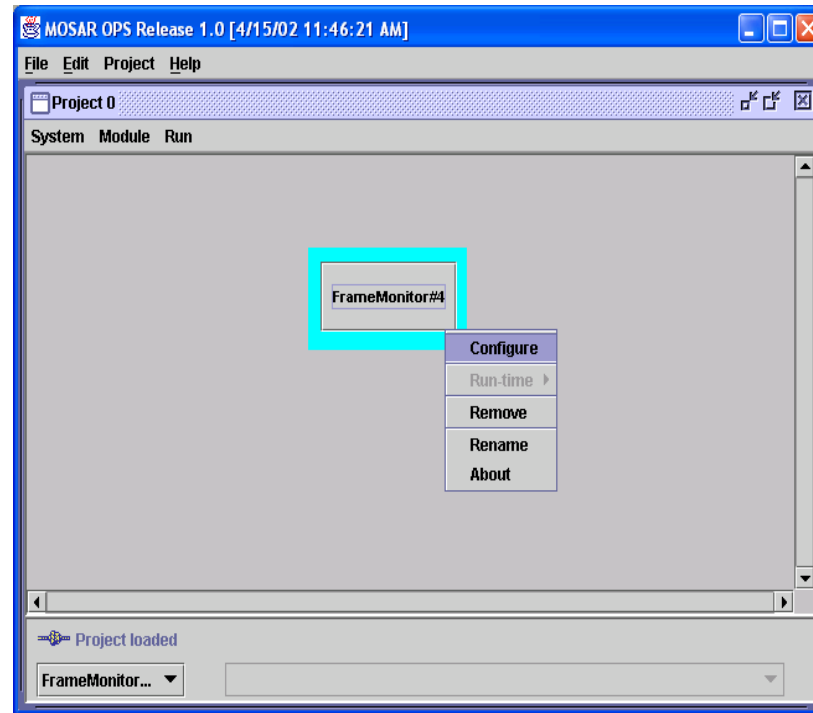
- Time & Page (System time and time from block header)
- Bits/Sec (bits per second received)
- Block Size (size of the block in bytes)
- Block Status (block status)
- Blocks Accepted (number of blocks per second)
- Block Header (octal displays of block header)
- Delta Time (µs) (calculated block delta time)
- Event Status (previous 4 events and time)
- Reset buttons (individual counters)
- 0 Bit (number of blocks received with sync errors)
- Reset All (resets all counters)

Use these to reset the individual counters

of blocks received with sync errors, if allowed. If the sync has 0 errors the 0 Bit will count

This button resets all counters

Frame Monitor



The Frame Monitor Module has 1 Input Channel and 1 Output Channel

It is a Run Time Configurable Module but it also can be configured when it is not running

Frame Monitor Configuration

Select the # of Syncs to check for prior to locking. In Command Mode it will lock on a single occurrence of frame sync. In Telemetry Mode after Sync is detected it will not go to lock unless it detects sync at the start of the next frame

Enter up to 32 bits of the sync pattern in Hex

Bit location for the start of the subframe counter. The frame starts with bit 0

Maximum count in Hex

Frame size in bytes

This is used to verify the lock status

When checked the system will create a statistic file and store it where the user has specified

The screenshot shows the 'FrameMonitor Config' dialog box with the following sections and fields:

- Data Type:** ☒ Telemetry, ☐ Command
- Data Format:** ☐ Block Data, ☒ Serial Data
- Sync Parameters:**
 - Pattern: Size: bits
 - ID Location: ID Size:
 - Max. Value: Min. Value:
 - Polarity: ☒ Sub-Frame
- Frame Parameters:**
 - Size: Err Mode:
 - Bit Rate:
- Select Database:**
- Select PDF:**
- ☒ **Statistic File Flag**
- Statistic File:**
-

Use Block Data when connection to Channel 3 of the Block Monitor.

Use Serial Data when connecting to Channel 1 of Block Monitor or any other module

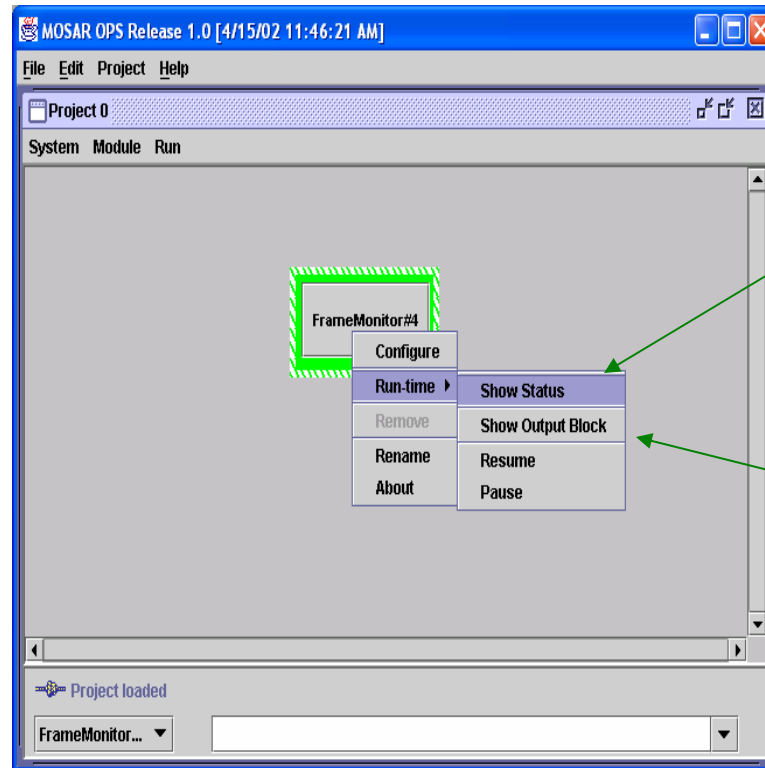
Sync Length

Subframe counter size

Minimum Subframe counter

Allows for up to 3 bits of error in the frame sync pattern

Frame Monitor



Open the Status Window

Open the dump window

Frame Monitor Status

Frames Expected based on the Bit Rate/Frame Length Calculation

Total number of Good Frames

Total number of frames with true sync and inverted sync

Total number of drop outs

Total number of frames with 0 bit errors, 1 bit error, 2 bit errors, or 3 bit errors, if selected.

Clears all counters

Display of last four sync events

The screenshot shows the 'FrameMonitor#3 Status' window. It is divided into several sections: 'Frame Status' on the top left, 'Time & Page' on the top right, 'Frame Sync Errors' in the middle left, 'Sub Frame Status' in the middle right, and 'Event Status' at the bottom. The 'Frame Status' section includes 'Frms Expt: 16797', 'Frms Acpt: 16416', 'True Sync: 16416', 'Invert Sync: 0', and 'DropOut: 42'. The 'Frame Sync Errors' section shows '0 Bit: 16416', '1 Bit: 0', '2 Bit: 0', and '3 Bit: 0'. The 'Time & Page' section shows 'Display Time: 104:13:49:28.730', 'Lock Status: Lock', 'PDF Name:', 'Data Len: 240', 'Frms/Sec: 98.9', and 'Bits/Sec: 189910'. The 'Sub Frame Status' section shows 'Lock Status: Lock' and 'Drop: 43'. The 'Event Status' section lists four sync events with timestamps and details like 'Sync lock, 2 frames lost, ID 02'. Green arrows point from text labels to specific elements in the window: 'Frames Expected...' points to 'Frms Expt'; 'Total number of Good Frames' points to 'Frms Acpt'; 'Total number of frames with true sync...' points to 'True Sync'; 'Total number of drop outs' points to 'DropOut'; 'Total number of frames with 0 bit errors...' points to the '0 Bit' line; 'Clears all counters' points to the 'Reset All' button; 'Display of last four sync events' points to the 'Event Status' list; 'Frame Lock Status' points to the 'Lock Status: Lock' indicator; 'Calculated Bit rate and Frames/Second' points to 'Frms/Sec' and 'Bits/Sec'; 'Clears Subframe drop counter' points to the 'Reset' button in the 'Sub Frame Status' section; and 'Subframe Lock Status and Drop Count' points to the 'Lock Status' and 'Drop: 43' in the 'Sub Frame Status' section.

Frame Lock Status

Calculated Bit rate and Frames/Second

Clears Subframe drop counter

Subframe Lock Status and Drop Count

Frame Monitor Dump Display

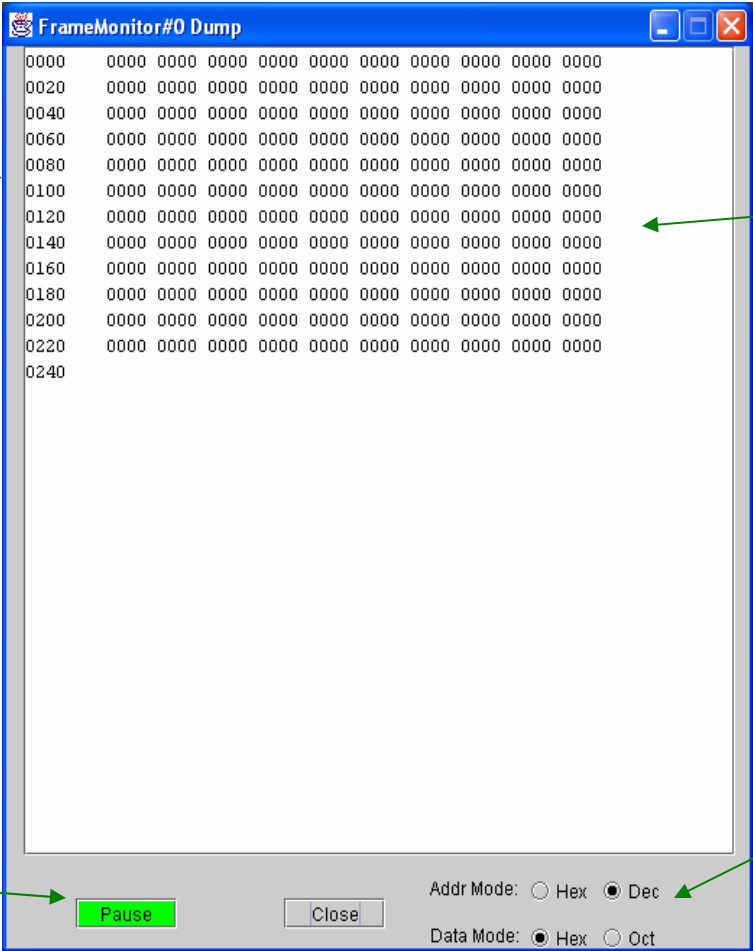
Byte Address

This display is representative of the data dump displays used in the system. The settings seen here also apply to those.

Allows the User to Freeze the Screen

Data Field

These settings allow the user to display the information in Hex or Octal and allows for the Address to be displayed in Hex or Decimal



The screenshot shows a window titled "FrameMonitor#0 Dump". The main area displays a data dump with 13 rows of addresses (0000 to 0240) and their corresponding data values (all 0000). The data is organized into columns of 16 bytes each. At the bottom, there are controls: a "Pause" button, a "Close" button, and two sets of radio buttons for "Addr Mode" (Hex, Dec) and "Data Mode" (Hex, Oct). The "Dec" and "Hex" options are currently selected.

Byte Address	Data Field
0000	0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
0020	0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
0040	0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
0060	0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
0080	0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
0100	0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
0120	0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
0140	0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
0160	0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
0180	0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
0200	0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
0220	0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
0240	

Statistic File Telemetry Mode

Header Information

- FRAME MONITOR EVENT LOG DATA

Frame Size and Data
Rate

- Date and time created: 104:13:51:53.358
- Frame Size: 240 bytes
- Data Rate: 192000 bps

The Statistic File logs the sync lock and drop times to the file specified in the Frame Monitor Configuration. It consists of a time tag, lock status, and minor frame information.

The time is the Block Time the event was detected in if the module is connected to output port 3 of the Block Monitor and the Module is configured to block mode. If the module is configured to serial mode this will be the system time.

The Frame Drop or Sync Lock indication comes from the sync detect logic.

The # of frames lost is based on a calculation of last good frame, lock frame, and time.

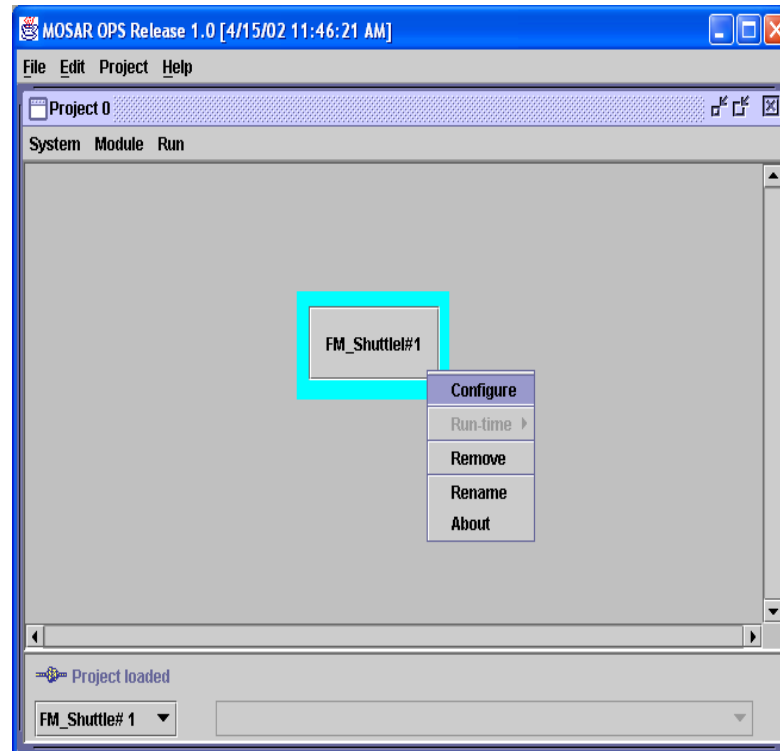
- 104:13:51:53.358 Module runs
- 104:13:51:58.525 Sync lock
- 104:13:52:06.977 Frame drop, last good minor frame ID 63
- 104:13:52:06.997 Sync lock, 1 frames lost, ID 01
- 104:13:52:07.989 Frame drop, last good minor frame ID 63
- 104:13:52:08.009 Sync lock, 1 frames lost, ID 01
- 104:13:52:08.990 Frame drop, last good minor frame ID 63
- 104:13:52:09.010 Sync lock, 1 frames lost, ID 01
- 104:13:52:09.992 Frame drop, last good minor frame ID 63
- 104:13:52:10.012 Sync lock, 1 frames lost, ID 01
- 104:13:52:16.010 Frame drop, last good minor frame ID 63
- 104:13:52:16.030 Sync lock, 1 frames lost, ID 01
- 104:13:52:17.012 Frame drop, last good minor frame ID 63
- 104:13:52:17.032 Sync lock, 1 frames lost, ID 01
- 104:13:52:25.624 Frame drop, last good minor frame ID 3B
- 104:13:52:25.634 Module stops

Statistic File Command Mode

In Command Mode, the Statistic File logs every time the sync detect logic records sync. It only records the time if the frame monitor is not locked. Care must be made when configuring the frame monitor to enter a bit rate that will allow the frame monitor to drop out.

- FRAME MONITOR EVENT LOG DATA
- Date and time created: 104:14:05:47.998
- Frame Size: 240 bytes
- Data Rate: 192000 bps
- 104:14:08:47.596 Module runs
- 104:14:09:01.136 Sync found
- 104:14:09:01.136 command found
- 104:14:09:02.638 command found
- 104:14:09:03.639 command found
- 104:14:09:05.642 command found
- 104:14:09:07.645 command found
- 104:14:09:08.646 command found
- 104:14:09:09.648 command found
- 104:14:09:11.641 command found
- 104:14:09:12.642 command found
- 104:14:09:13.644 command found
- 104:14:09:14.645 command found
- 104:14:09:15.646 command found
- 104:14:09:16.648 command found

Frame Monitor Shuttle



The Frame Monitor Shuttle is designed for supporting Orbiter D/L. It has 1 Input Channel and 1 Output Channel.

It is a Run Time Configurable Modules, but it also can be configured when the module is not running

Frame Monitor Shuttle Configuration

The user configures this module the same way that the Frame Monitor Module is configured.

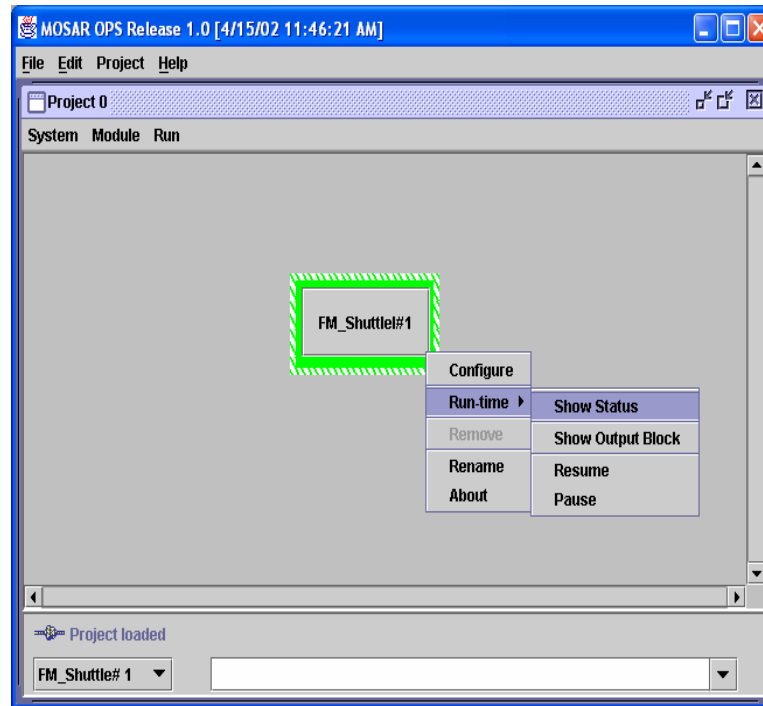
This module is designed to be connected to Block Monitor Channel 3 as the source of data.

Selecting Block Data allows the Block Time to be used for the Statistic File. Selecting Serial Data allows for the use of System Time.

The screenshot shows the 'ShuttleFrameMonitor Config' window with the following settings:

- Frame Monitor Configuration**
 - Data Format**
 - ☒ Block Data
 - ☐ Serial Data
 - Sync Parameters**
 - Pattern: faf320
 - Size: 24 bits
 - ID Location: 24
 - ID Size: 8
 - Max. Value: ff
 - Min. Value: 0
 - Polarity: APC
 - ☒ Sub-Frame
 - Frame Parameters**
 - Size: 240
 - Err Mode: None
 - Bit Rate: 192000
 - Select Database**
 - Select Database
 - Select PDF**
 - Select PDF
 - ☐ Statistic File Flag
 - Statistic File**
 - FMSHutEvent_104_14_17_14.txt
- Buttons**
 - Apply
 - Close

Frame Monitor Shuttle Run Time



The Frame Monitor Shuttle uses the standard Configure, Run Time drop menus.

Frame Monitor Shuttle Status

This status display is exactly like the Frame Monitor Module Status Display with the following exception

Source and Destination obtained from the NASCOM Block. This information is attached to the raw telemetry by the Block Monitor

Displays the Frame Lock Status and times for the last four lock events

The screenshot shows a window titled "FM_Shuttle#6 Status" with a blue title bar and standard Windows window controls. The window is divided into several sections:

- Frame Status:** Contains metrics for "Frms Expt: 3047", "Frms Acpt: 2310", "True Sync: 2310", "Invert Sync: 0", and "DropOut: 0". Each metric has a "Reset" button to its right. A "Reset All" button is located at the bottom of this section.
- Time & Page:** Displays "Display Time: 104:14:18:07.872", "Lock Status: Lock" (with a green indicator), "PDF Name:", "Bits/Sec: 153066", "Frms/Sec: 79.7", "Data Len: 0", "Source ID: 240", and "Dest ID: 64".
- Frame Sync Errors:** Shows "0 Bit: 2310", "1 Bit: 0", "2 Bit: 0", and "3 Bit: 0". Each has a "Reset" button. A "Reset All" button is at the bottom.
- Sub Frame Status:** Includes "Lock Status: Lock" (green indicator) and "Drop: 24" with a "Reset" button.
- Shuttle NSP:** Shows "Frame Sync: Unlock" (red indicator), "Bit Sync: Unlock" (red indicator), and "NSP Selected #: 1".
- Event Status:** A text area showing "Module runs" and "104:14:17:43.857 Sync lock".

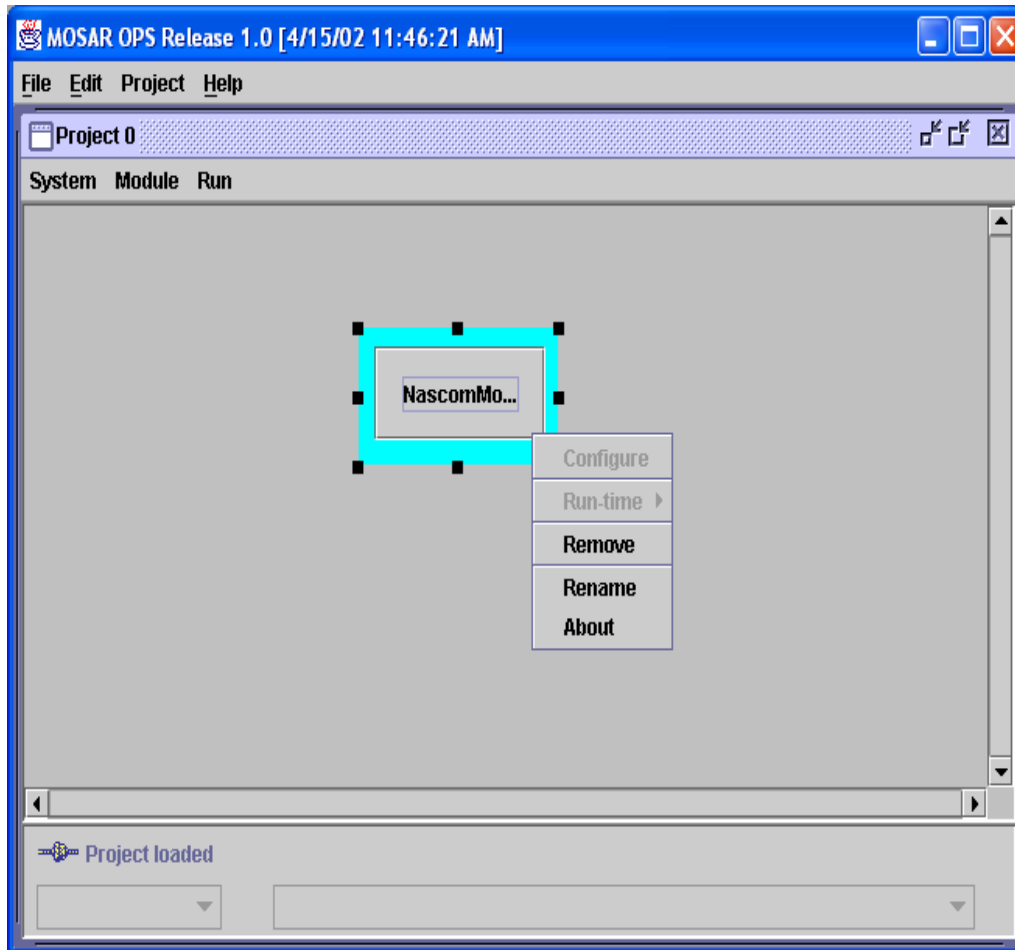
A "Close" button is located at the bottom center of the window.

Lock Status of the NSP Frame Sync

Lock Status of the NSP Bit Sync

Displays which NSP is selected in the TLM stream

NASCOM Monitor

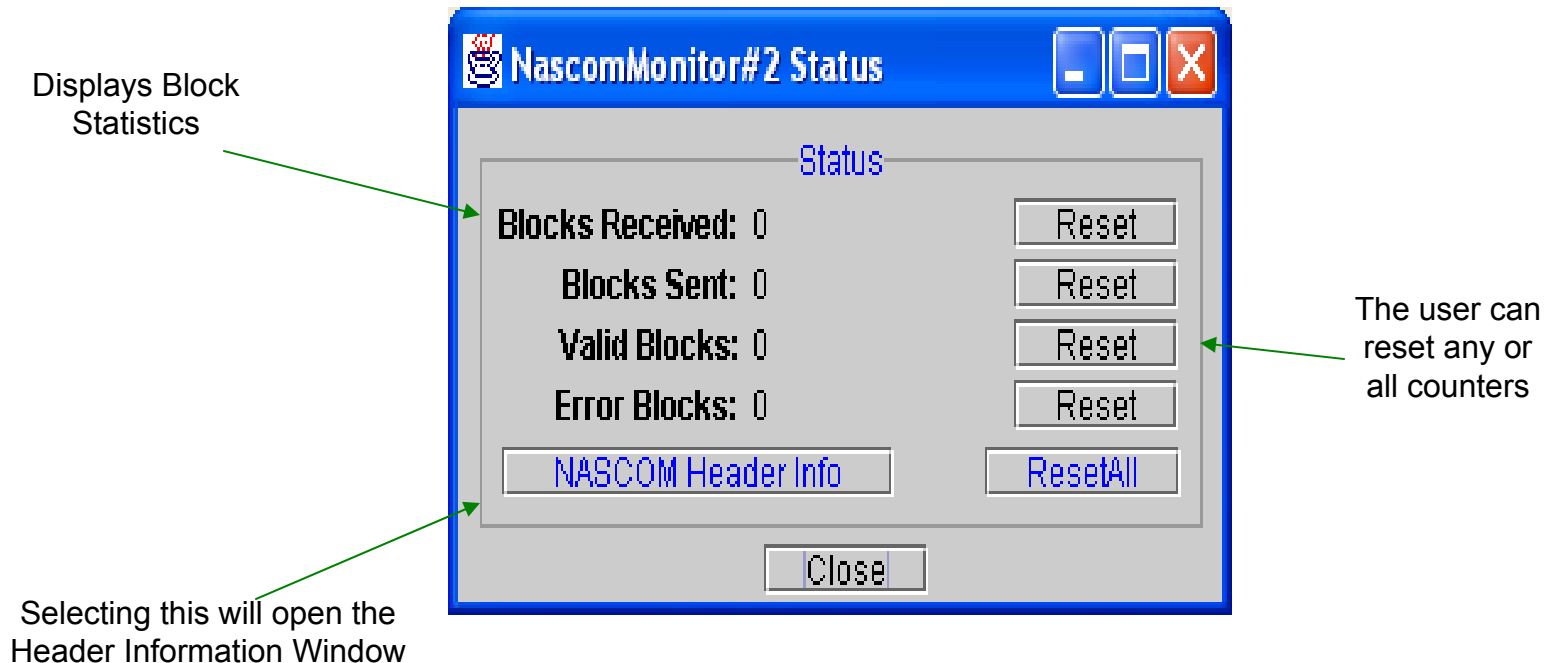


The NASCOM Monitor Module has 1 Input Channel and 1 Output Channel.

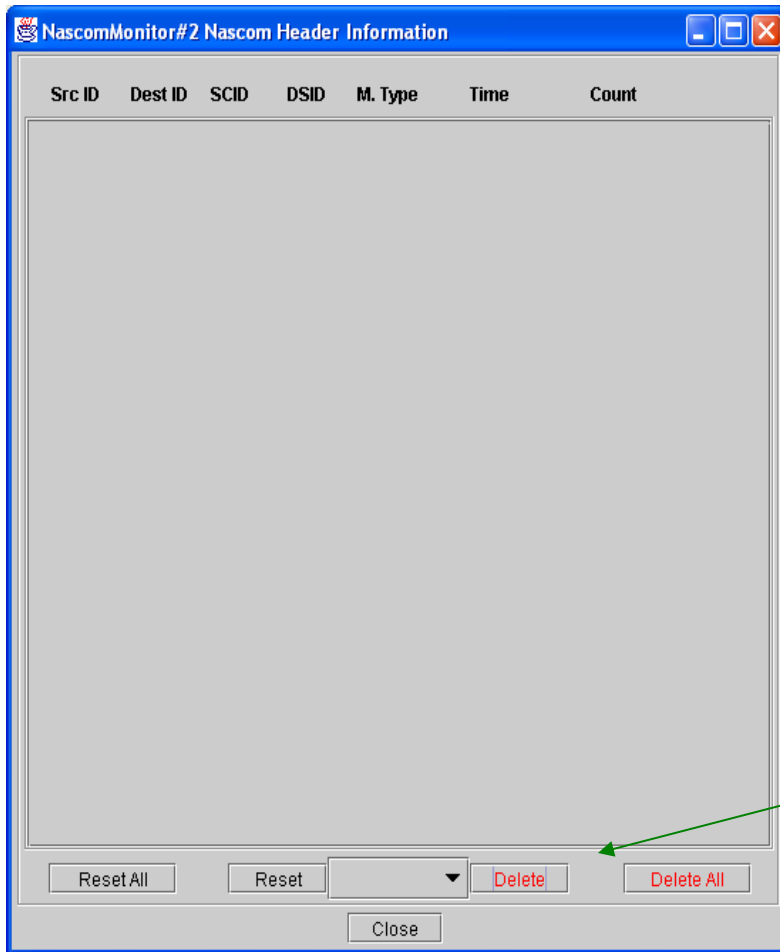
It has a set configuration. It requires a NASCOM Block with a RTP Header attached.

It is used for Validating the RTP header and Displaying the Header information. This is useful when you have multiple streams of NASCOM blocks on the same line.

NASCOM Monitor Status



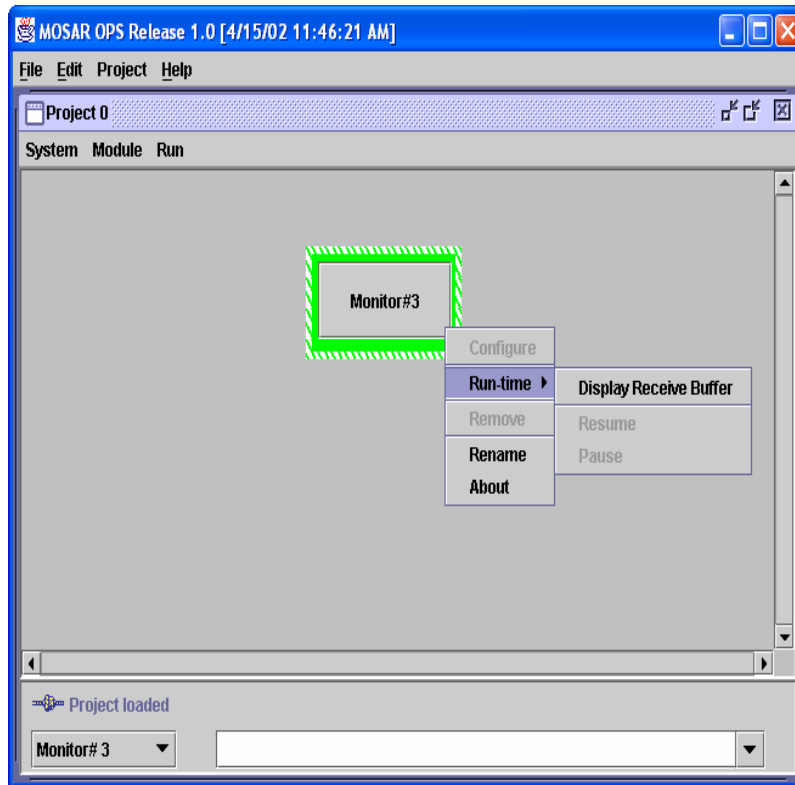
NASCOM Monitor Header Information



This display will display the header information of the blocks received by this module. Each different block will be shown on a separate line. For example if there are Shuttle Command Echos and Site Status Messages on the same data line there will be two lines on the display.

Using these buttons will allow the user to delete lines or reset counters for a specific line or for all lines.

Monitor Module



The Monitor Module has 1 Input Channel and No Output Channel.

It is not configurable.

It is a powerful test tool for displaying data.

Monitor Module Display

The screenshot shows a window titled "Monitor Receive Dump #3" with a large text area displaying a hex dump of data. The data is organized in rows, with addresses on the left (0000 to 0600) and hex values on the right. Below the text area are several control panels: "Bit Mode" (8 Bit, 16 Bit, 32 Bit), "Addr Mode" (Hex, Oct, Dec), "Data Mode" (Hex, Oct, Dec), "Encoding" (NRZ-L, NRZ-M), "Incoming Data" (NRZ-L, NRZ-M), and an "Invert" checkbox. At the bottom is a "Bit Slip" slider and a "Pause" button. Annotations with green arrows point to these controls, explaining their functions.

Allows the user to display the data in Hex, Octal, Or Decimal

Allows the address to displayed in Hex, Octal or Decimal

Allows the data to be displayed in 8, 16, or 32 bit groups

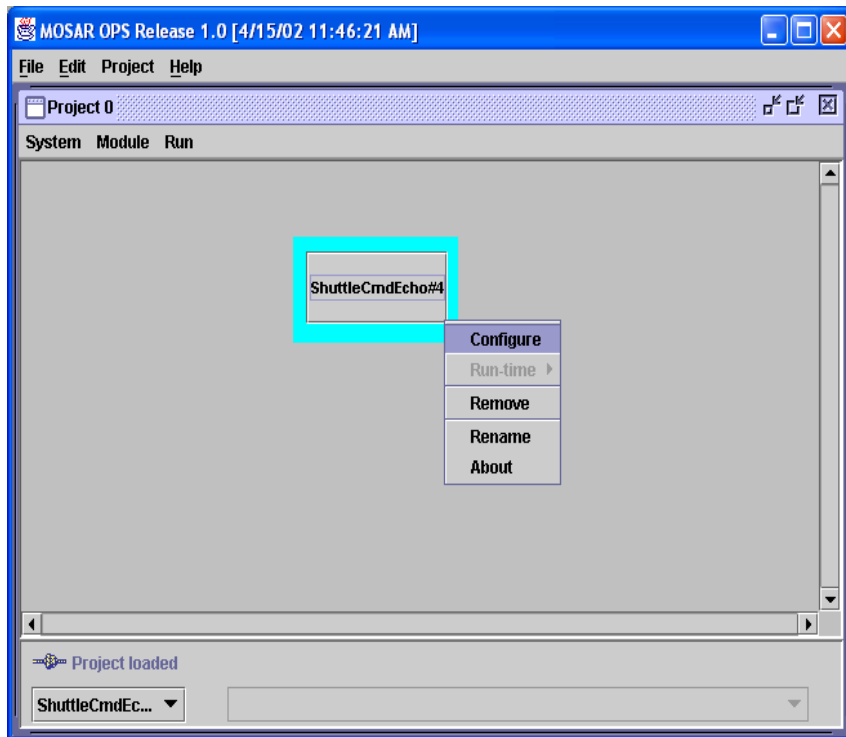
Allows the user to invert the data in the display

Allows the user to Encode the data from NRZ-L to NRZ-M or M to L

Allows the user to specify the incoming data code

Allow the user to bit shift the data to the right or to the left by up to 32 bits 1 bit at a time

Shuttle Command Echo Module



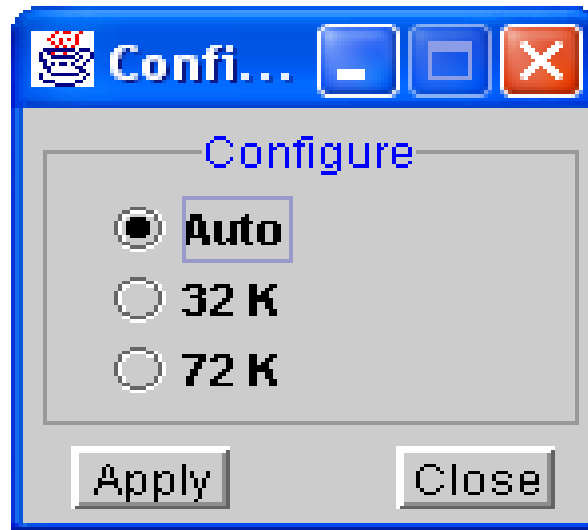
The Shuttle Command Echo Monitor
has 1 Input and 1 Output.

It is a Non-Run Time Configurable
Module

It requires synchronized data and
outputs the orbiter command words

Shuttle Command Echo Configuration

The user can select which type of data to use, but the module will function perfectly in Auto mode.



Shuttle Command Status Display

This will display the data type it receives, either 32 kbps or 72 kbps. If the module is in Auto mode it will switch to the received data type

Total # of Commands in the stream

Total # of BCH errors received

Commands will be displayed in this area

The screenshot shows a Windows-style application window titled "ShuttleCmdEcho#4 Status". The window is divided into two main sections. The top section, titled "Status", contains three labels: "Stream: ****", "Command: 0", and "BCH Error: 0". To the right of these labels are three buttons: "Reset", "Reset", and "ResetAll". The bottom section, titled "Command Display", is a large empty rectangular area. At the bottom of this section is a "Clear" button. At the very bottom of the window is a "Close" button. Green arrows point from external text labels to specific elements: one to the "Stream" label, one to the "Command: 0" label, one to the "BCH Error: 0" label, one to the "ResetAll" button, one to the "Command Display" area, and one to the "Clear" button.

Status	
Stream: ****	
Command: 0	Reset
BCH Error: 0	Reset
	ResetAll

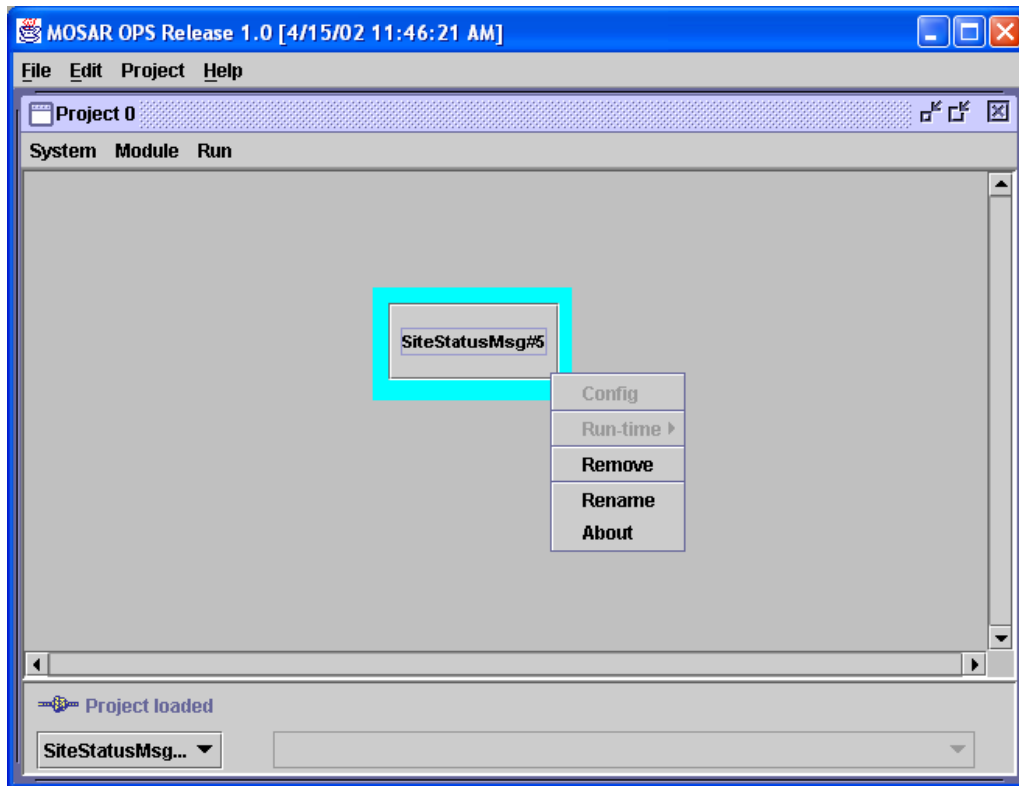
Command Display	
Clear	

Close

Reset the counters

Clear the Command Display area

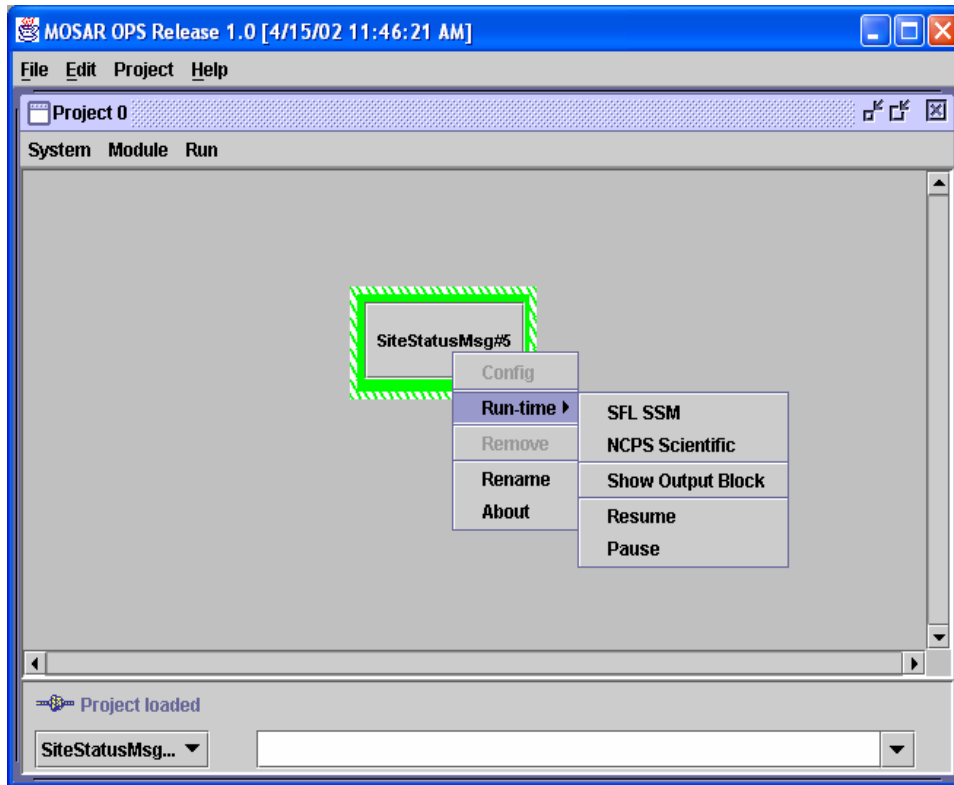
Site Status



The Site Status module has 1 Input Channel and no Output Channels.

It is a fixed configuration module

Site Status Message Run Time



Use the Run Time Window to select the desired display.

The module requires deblocked data. This can be obtained from the Channel 1 output of the Block Monitor.

Site Status Displays

CMD SSM#5 Status

Time & Page
Display Time: 2002:316:10:56:01

SFL SSM

SSM Block:

Flight: Orbiter:
Vehicle: Source:
S/W Seq:

Setup
Black Red

Input:
Mode:
Data Rate:
RF Verify:
Data Code:
SFLDS:

Fwd Block Input

Block/Sec:
Last DSID:
Block Rcvd:
Blk Reject:
Hdr Err Mode:
Header Err:
Blk Seq Err:
Source Err:
DSID Err:
PEP Err:

Status
Black Red

RF Output:
RF Verify:
RF Verify Err:
Frame/Sec:
Deblocker:
Symbol:
Sync Loss:

Block Output

Status Block:
Status Dest:
Status Out:
Echo Block:
Echo Dest:
Echo Out:
Total Advis:

CMD SSM#5 NCPS Scientific Status

Time & Page
Display Time: 2002:316:10:56:39

NCPS Scientific SSM

SSM Block:

SupportID: SCID: Source:

Status

Rcvd Block:
Rcvd Cmd:
Cmd Uplink:
Cmd Not Uplink:
Advisory:

Input Block

POCC 1 Src:
POCC 2 Src:
PEP Check:

Config

Preamble:
Postamble:
Buffered TP:
Idle Pattern:
Cmd Echo:
Data Code:

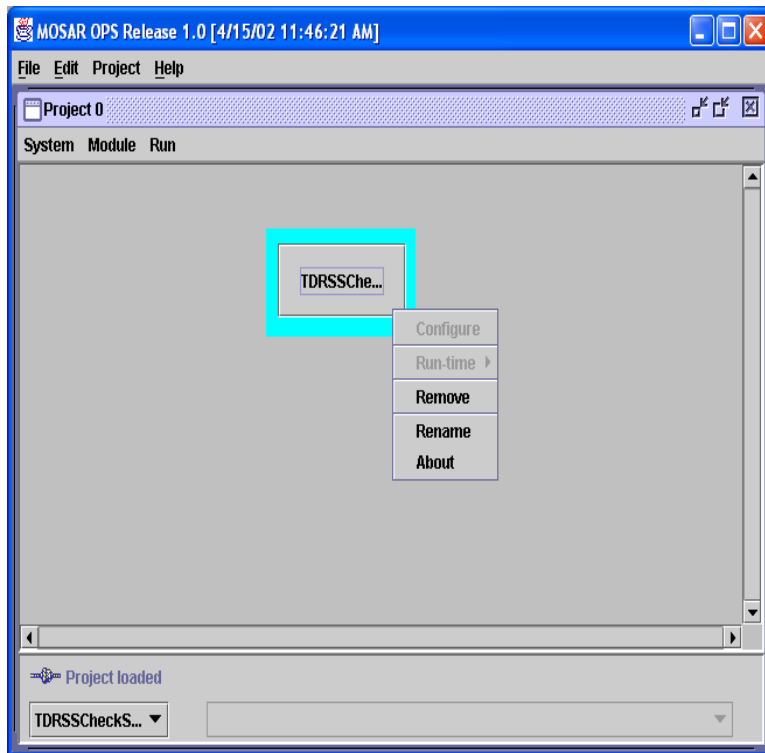
Discrete

Cmd: Mode:
RF: Verify:
Hardline: RF Verify:
Antenna/Dummy:

NCPS Input Block

	Src	Dest	Seq	Type	Length
Last:					
Last-1:					
Last-2:					
Last-3:					

TDRSS CheckSum Module

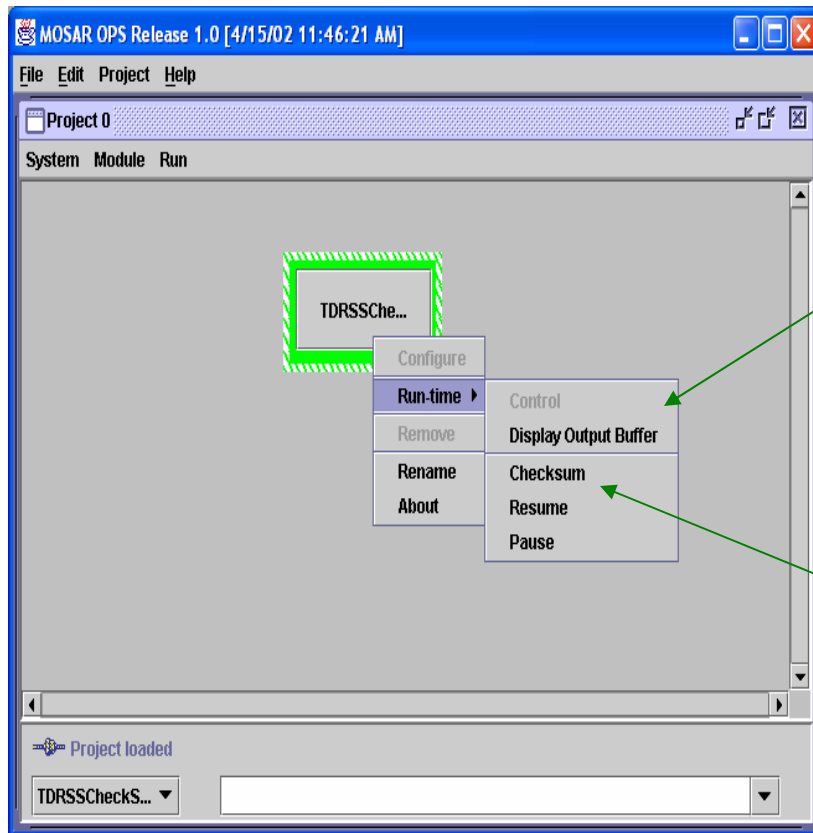


The TDRSS Checksum Module is designed to receive synchronizer 1 or 4 kbps TDRSS data.

It has 1 Input Channel and no Output Channels.

It is a fixed configuration Module

TDRSS Checksum Run Time



Access Data
Display

Access Status
Display

TDRSS Checksum Status Display

The screenshot shows a Windows-style dialog box titled "TDRSS Checksum #6". It contains several input fields for tracking checksum data. The fields are arranged vertically, each with a label to its left and a text box to its right. The text boxes contain the following values: "SCID" is "*****", "Frames Received" is "0", "Subframe #" is "0", "Checksum Errors" is "0", "Calculated" is "0", and "Received" is "0". At the bottom of the dialog, there are two buttons: "Reset" on the left and "Close" on the right. The dialog has a blue title bar and standard Windows window controls (minimize, maximize, close) in the top right corner.

Field	Value
SCID	*****
Frames Received	0
Subframe #	0
Checksum Errors	0
Calculated	0
Received	0

Spacecraft ID, This is determine from the data stream

Total # of Frames Received

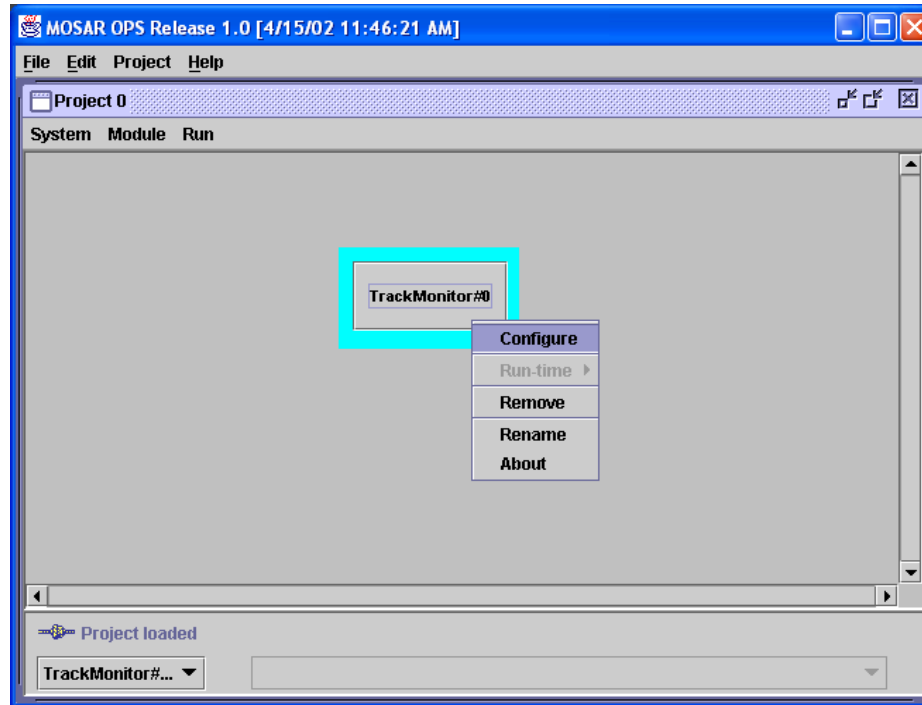
Current Subframe #

Total # of Checksum Errors

Calculated Checksum

Checksum from data stream

Track Monitor Module



The Track Monitor Module has 1 Input Channel and no Output Channels.

It is a Non-Run Time Configurable module. The only configuration options are the source of data. It can receive either NASCOM 4800 Bit Blocks or it can receive TTY data

Track Monitor Status Display

This row lists the type of tracking data that can be received

This indicates the source of the data

If the Box is yellow, it indicates the data is “Stale”.
If the box is Green, it indicates that the data is current and still be received.

Left clicking on a box will bring up the Status window for the data

Right Clicking on a box will allow the user to see a dump of the raw data or remove the block from the display.

The screenshot shows a window titled "TrackMonitor#0 Status". It contains a table with the following columns: HSUTDF, LSUTDF, LTAS, MDDF, and 46 Char. The table has 15 rows. The data is as follows:

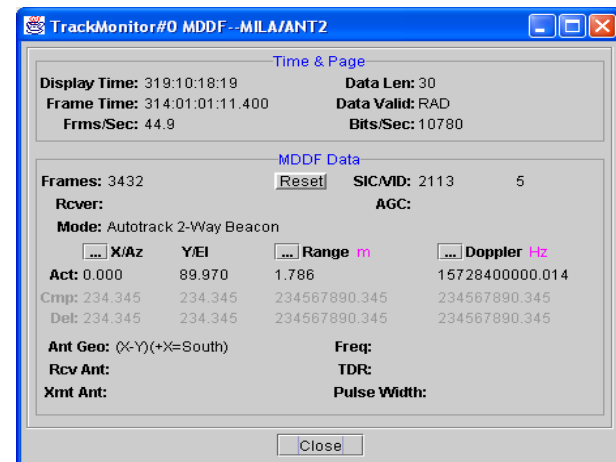
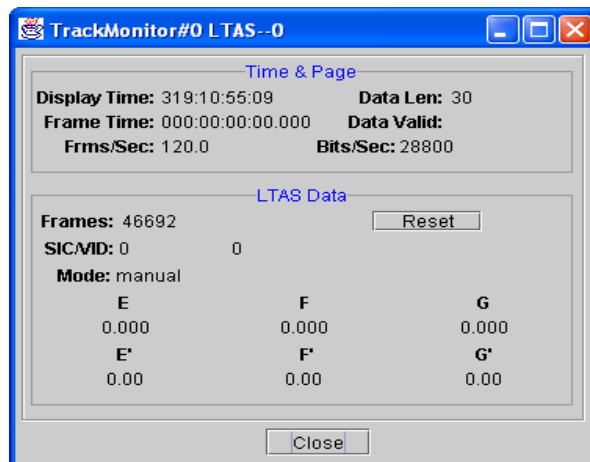
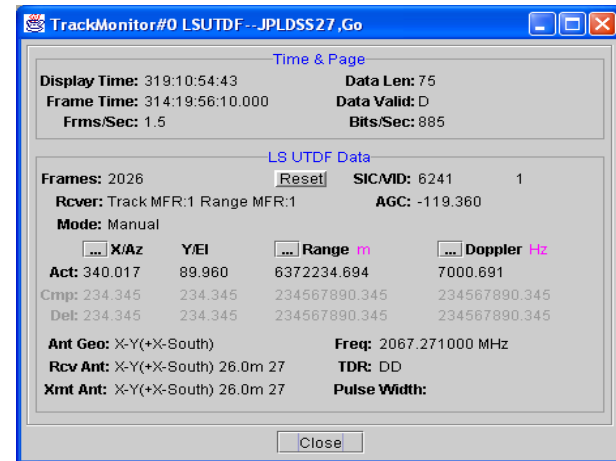
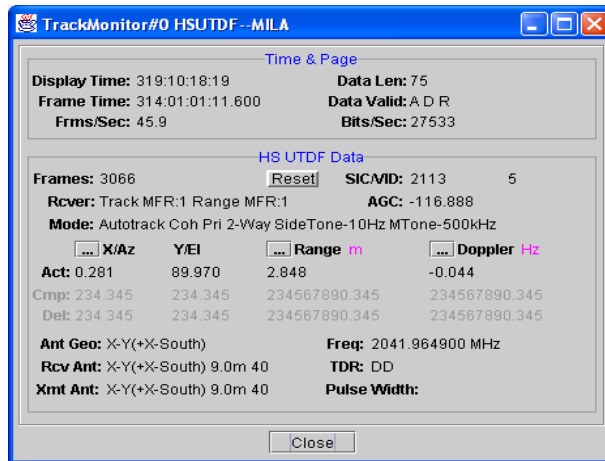
HSUTDF	LSUTDF	LTAS	MDDF	46 Char
MILA	JPL-DSS16(G		MILA/ANT2	0
Wallops-TOT	Wallops-TOT			
WFF-TOTS	WFF-TOTS			
	JPL-DSS46(T			
	DSS66,Madri			
	JPLDSS27,Go			

Green arrows point to the following cells:

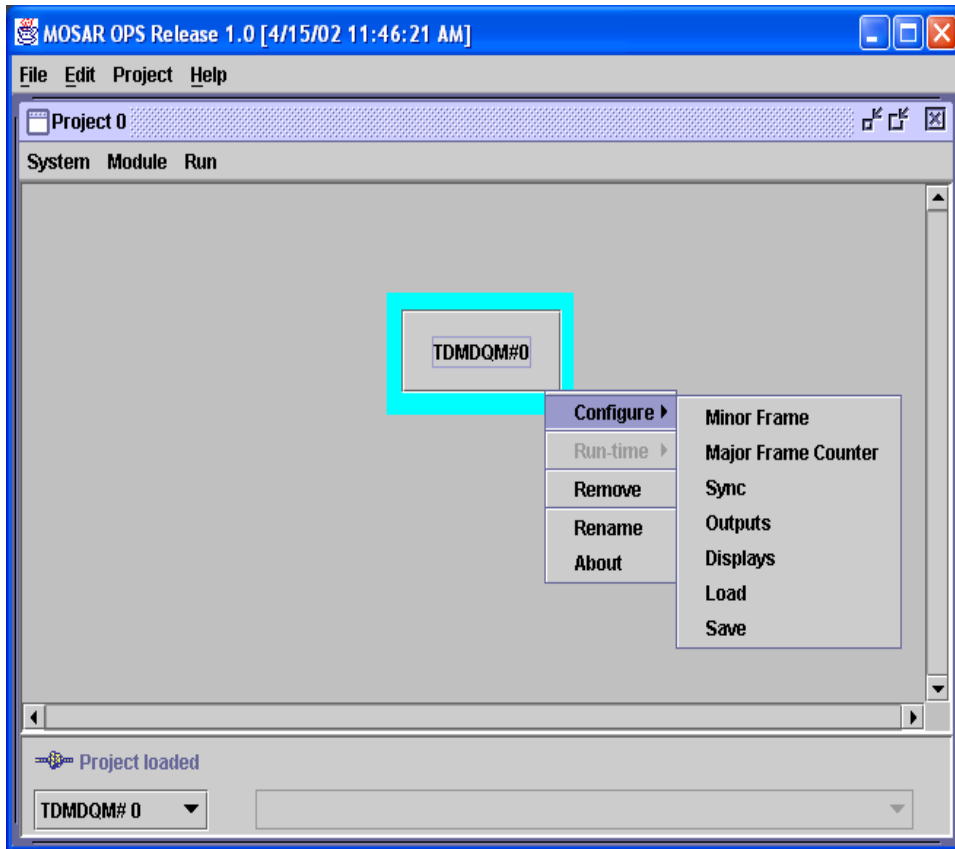
- Row 1, Column 1 (MILA)
- Row 1, Column 2 (JPL-DSS16(G
- Row 1, Column 4 (MILA/ANT2)
- Row 1, Column 5 (0)
- Row 2, Column 2 (Wallops-TOT)
- Row 3, Column 2 (WFF-TOTS)
- Row 4, Column 2 (JPL-DSS46(T
- Row 5, Column 2 (DSS66,Madri)
- Row 6, Column 2 (JPLDSS27,Go)

A "Close" button is located at the bottom center of the window.

Track Monitor Display Examples



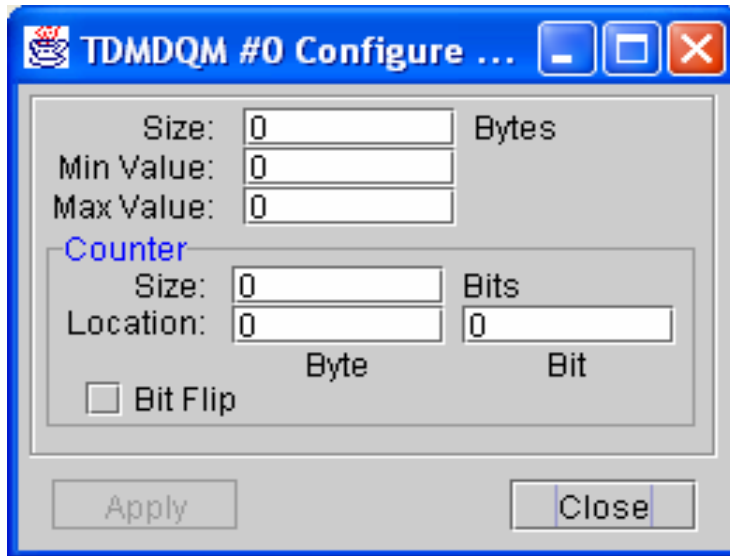
TDM DQM



TDM DQM has 1 Input Channel
and 3 Output Channels.

It is a non-Run Time Configurable
Module

TDM DQM Configuration



TDMDQM #0 Configure ...

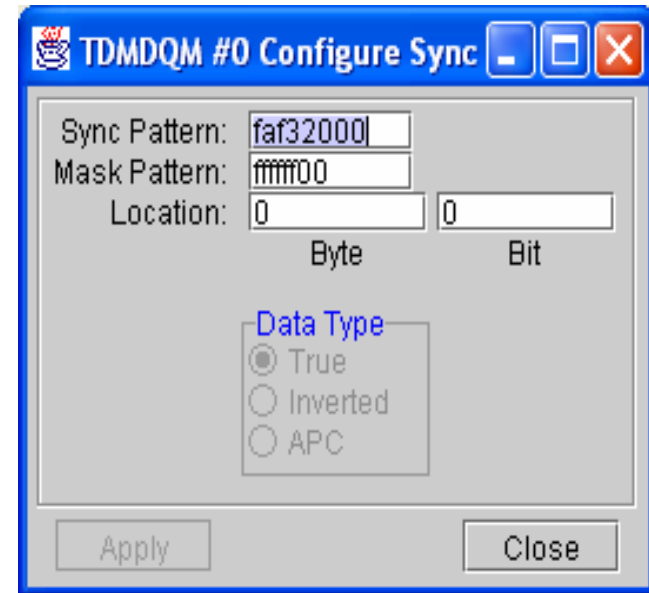
Size: 0 Bytes
Min Value: 0
Max Value: 0

Counter

Size: 0 Bits
Location: 0 Byte 0 Bit

☐ Bit Flip

Apply Close



TDMDQM #0 Configure Sync

Sync Pattern: faf32000
Mask Pattern: ffff00
Location: 0 Byte 0 Bit

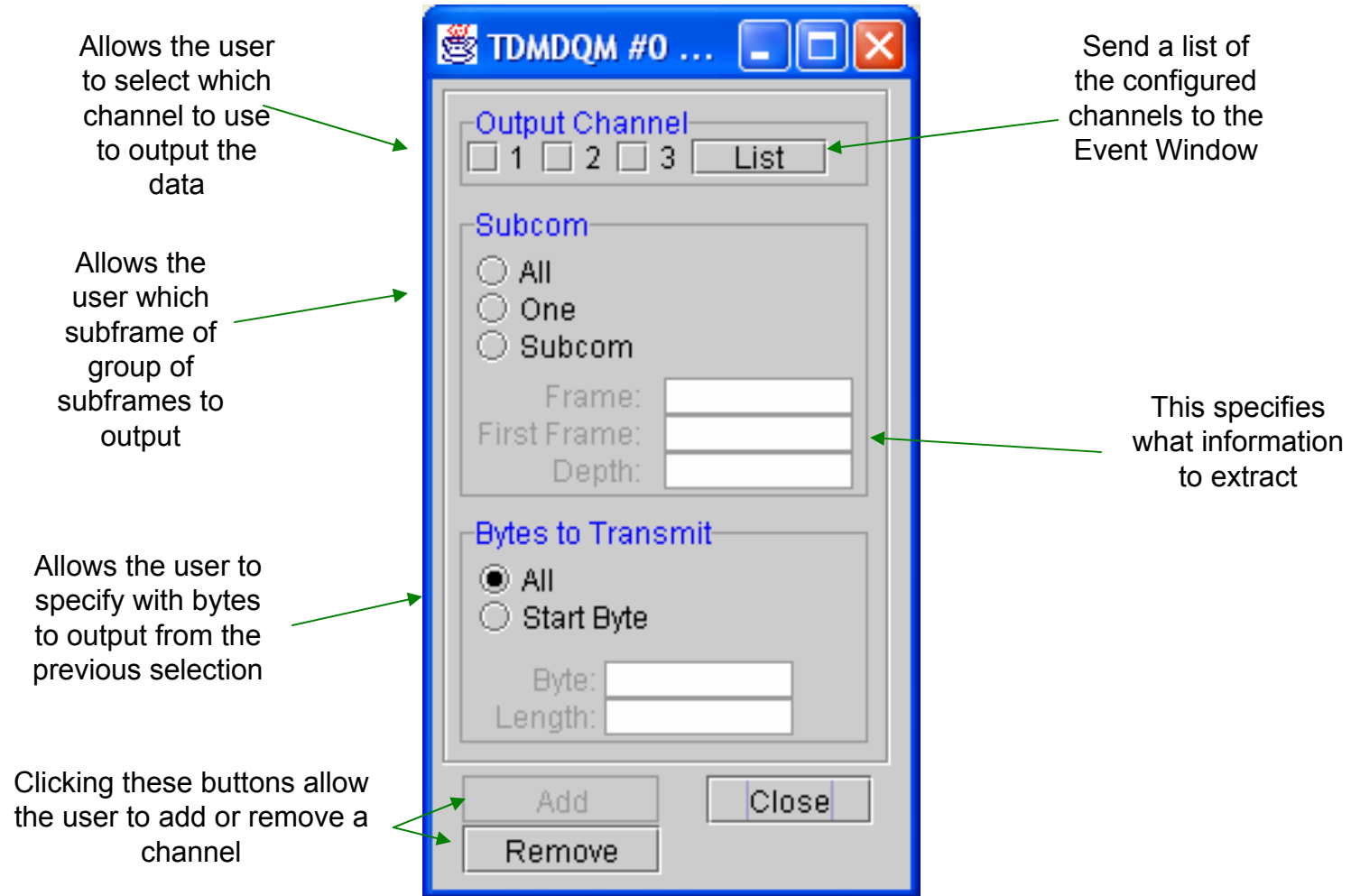
Data Type

☒ True
☐ Inverted
☐ APC

Apply Close

These configuration windows allow the user to specify the information required to synchronize on the TDM Data Stream. The input data stream requires the data to be synchronized by the previous module.

TDM DQM Configuration



TDM DQM Configuration

The screenshot shows a software window titled "TDMDQM #0 Configure Displays". It contains two main sections: "Telemetry" and "Command Counters".

Telemetry Section: This section contains a table with 20 rows, indexed 0 to 19. Each row has five input fields: "Start Frame", "Subcom", "Start Byte", "Start Bit", and "Bit Length". All fields in this section are currently set to 0.

	Start Frame	Subcom	Start Byte	Start Bit	Bit Length
0	0	1	0	0	0
1	0	1	0	0	0
2	0	1	0	0	0
3	0	1	0	0	0
4	0	1	0	0	0
5	0	1	0	0	0
6	0	1	0	0	0
7	0	1	0	0	0
8	0	1	0	0	0
9	0	1	0	0	0
10	0	1	0	0	0
11	0	1	0	0	0
12	0	1	0	0	0
13	0	1	0	0	0
14	0	1	0	0	0
15	0	1	0	0	0
16	0	1	0	0	0
17	0	1	0	0	0
18	0	1	0	0	0
19	0	1	0	0	0

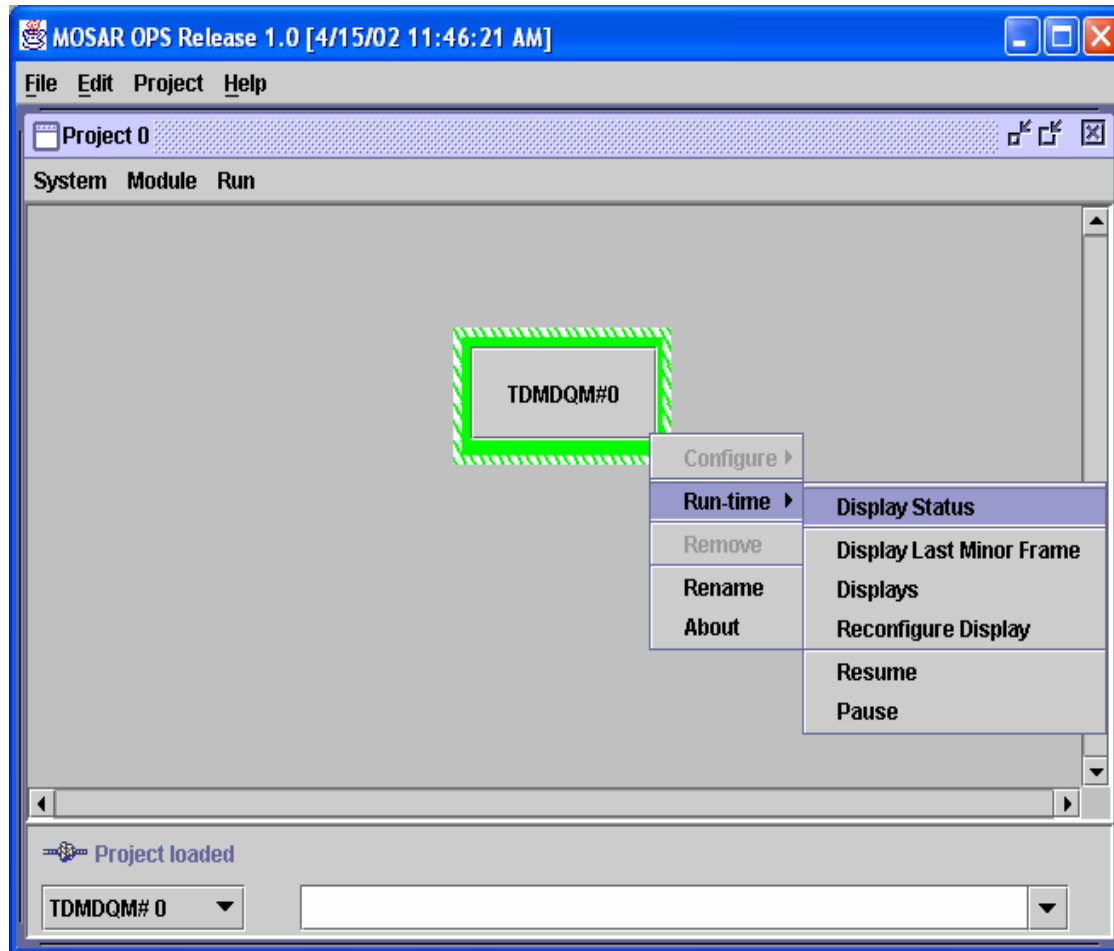
Command Counters Section: This section contains a table with 2 rows, indexed 0 and 1. Each row has five input fields: "Start Frame", "Subcom", "Start Byte", "Start Bit", and "Bit Length".

	Start Frame	Subcom	Start Byte	Start Bit	Bit Length
0	0	1	0	0	0
1	0	1	0	0	0

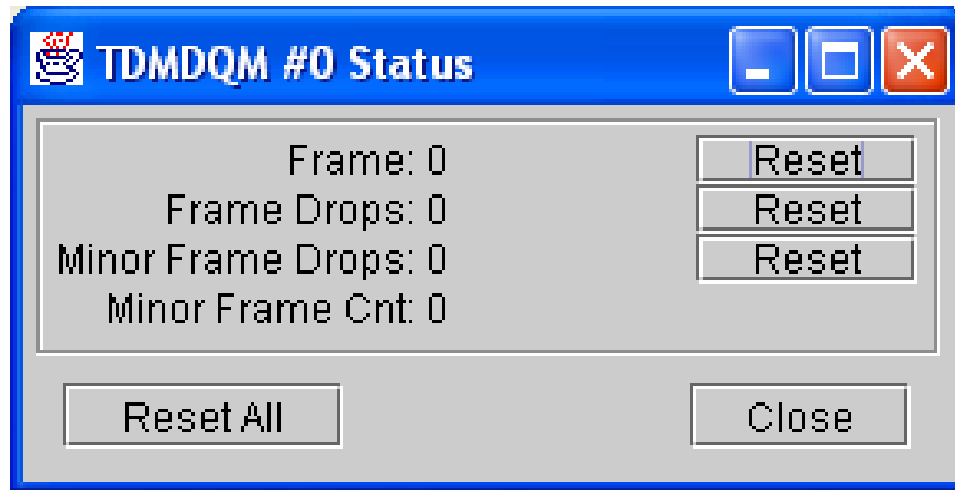
At the bottom of the window, there are two buttons: "Apply" and "Close".

This allows the user to select individual pieces of information to be displayed. The maximum is 32 bits per displays.

TDM DQM Status Displays



TDM DQM Status Displays



This display gives the status of the incoming data.

TDM DQM Status Displays

The screenshot shows a software window titled "TDMDQM #0 Output Displays". It contains two main sections: "Telemetry" and "Command Counters".

Telemetry Section:

	Start Frame	Subcom	Start Byte	Start Bit	Bit Length	Value
0	0	1	0	0	0	0 Hex
1	0	1	0	0	0	0 Hex
2	0	1	0	0	0	0 Hex
3	0	1	0	0	0	0 Hex
4	0	1	0	0	0	0 Hex
5	0	1	0	0	0	0 Hex
6	0	1	0	0	0	0 Hex
7	0	1	0	0	0	0 Hex
8	0	1	0	0	0	0 Hex
9	0	1	0	0	0	0 Hex
10	0	1	0	0	0	0 Hex
11	0	1	0	0	0	0 Hex
12	0	1	0	0	0	0 Hex
13	0	1	0	0	0	0 Hex
14	0	1	0	0	0	0 Hex
15	0	1	0	0	0	0 Hex
16	0	1	0	0	0	0 Hex
17	0	1	0	0	0	0 Hex
18	0	1	0	0	0	0 Hex
19	0	1	0	0	0	0 Hex

Command Counters Section:

0	0	1	0	0	0	0 Hex
1	0	1	0	0	0	0 Hex

A "Close" button is located at the bottom center of the window.

This window displays the data that the user selected.

TDM DQM Status Displays

TDMDQM #0 Configure Displays

Telemetry

	Start Frame	Subcom	Start Byte	Start Bit	Bit Length
0	0	1	0	0	0
1	0	1	0	0	0
2	0	1	0	0	0
3	0	1	0	0	0
4	0	1	0	0	0
5	0	1	0	0	0
6	0	1	0	0	0
7	0	1	0	0	0
8	0	1	0	0	0
9	0	1	0	0	0
10	0	1	0	0	0
11	0	1	0	0	0
12	0	1	0	0	0
13	0	1	0	0	0
14	0	1	0	0	0
15	0	1	0	0	0
16	0	1	0	0	0
17	0	1	0	0	0
18	0	1	0	0	0
19	0	1	0	0	0

Command Counters

	Start Frame	Subcom	Start Byte	Start Bit	Bit Length
0	0	1	0	0	0
1	0	1	0	0	0

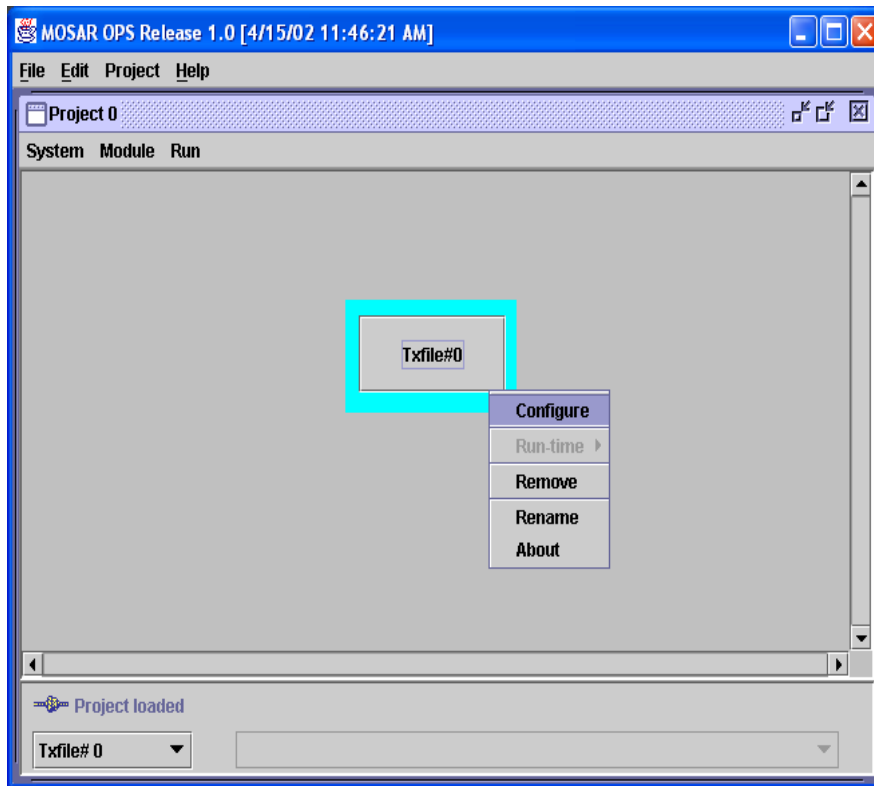
Apply Close

This window allows the user to reconfigure the display while the module is running

Data File Handling Modules

- These modules allow the user to store or retrieve data to a disk or CD.
 - TXFILE
 - LogModule

TXFILE



TXFILE has no Input Channels and 1 Output Channel.

This module can either be configured in Run Time or Non-Run Time

TXFILE Configuration Window

Allow the User to enter the name of the file to be played back

Position in the file to start playing in bytes

In Offset Mode the Offset is the number of bytes between block of data

In Manual Output Mode this module will transmit 1 block of data every time send is clicked.

The screenshot shows the 'Txfile #0 Transmit' window with the following sections and controls:

- File Information:** Includes a 'Filename:' text field with a browse button (...), a 'Start pos:' text field (set to 0), a 'Blocksize:' text field (set to 0), and a 'Reverse order' checkbox.
- File Read Mode:** Includes radio buttons for 'Offset' (selected), 'Sync', 'Length', and 'Log file'. It also has fields for 'Offset:', 'Size:', 'Pattern:', 'Bit pos:', 'No. of bits:', and 'Adjustment:'. There are checkboxes for 'Use log file timing' and 'Define times', followed by a time selection grid with fields for Year, Day, Hour, Min, Sec, and Msec.
- Output Mode:** Includes radio buttons for 'Manual' (selected), 'Auto-Complete File', and 'Auto-Blocks'. It has fields for 'Cycles:', 'Blocks Read:', and 'Blocks Sent:'. There is also an 'Interval:' field set to 2000 msec.
- Operation:** Includes buttons for 'Load', 'Send', 'Continuously', and 'Stop'.
- Footer:** Includes 'Apply' and 'Close' buttons.

Annotations with green arrows point to specific controls:

- From 'Filename:' to: 'Allow the User to enter the name of the file to be played back'
- From 'Start pos:' to: 'Position in the file to start playing in bytes'
- From 'Offset:' to: 'In Offset Mode the Offset is the number of bytes between block of data'
- From 'Manual' to: 'In Manual Output Mode this module will transmit 1 block of data every time send is clicked.'
- From the browse button (...) to: 'Opens the File Browser Window.'
- From 'Blocksize:' to: 'Creates a file on the hard drive with the same name as the selected file with a .RSV extension. This essentially creates a reverse playback.'
- From the 'Interval:' field to: 'Enter the size of the data block to be played back'

TXFILE Configuration Window

If the file was recorded using the logmodule with logheader selected, select this. It is not required to enter the Blocksize or Offset as this information is supplied in the logheader.

Selecting this will read the time in the logheader and transmit the blocks at the appropriate rate.

Selecting Define Times allows the user to play back a portion of the file based on the times in the logheader.

In this mode the module will transmit the entire file.

This allows the user to enter the number of times to play the file. If 0 is entered the file will play until stopped

This specifies the interval between blocks. If this module is connected to an AVTEC Serial Output or Serial Output module, this is not used.

The screenshot shows the 'Txfile #0 Transmit' window with the following sections and controls:

- File Information:** Filename: [text box], Start pos: 0, Blocksize: 0, Reverse order: ☐
- File Read Mode:**
 - Offset: ☐ Offset: 0
 - Sync: ☐ Size: [text box] Pattern: [text box]
 - Length: ☐ Bit pos: [text box] No. of bits: [text box] Adjustment: [text box]
 - Log file:** ☒ Use log file timing: ☐ Define times: ☐
 - Start: [0] [0] [0] [0] [0] [0] (Year, Day, Hour, Min, Sec, Msec)
 - Stop: [0] [0] [0] [0] [0] [0] (Year, Day, Hour, Min, Sec, Msec)
- Output Mode:**
 - Manual: ☐
 - Auto-Complete File:** ☒ Cycles: 0
 - Auto-Blocks: ☐ Blocks Read: 0 Blocks Sent: 0
 - Interval: 2000 msec
- Operation:** Load, Send, Continuously, Stop
- Buttons:** Apply, Close

Annotations with green arrows point from the text blocks to the following controls in the window:

- From the first text block to the 'Log file' radio button.
- From the second text block to the 'Use log file timing' checkbox.
- From the third text block to the 'Define times' checkbox.
- From the fourth text block to the 'Auto-Complete File' radio button.
- From the fifth text block to the 'Cycles' text box.
- From the sixth text block to the 'Interval' text box.

TXFILE Configuration Window

This mode allows the user to specify the number of blocks to read and the number of blocks to send. For Example, this is useful if you would like to transmit the a single block 5 times or 5 block 20 times. The rate that the blocks are transmitted is controlled by either the specified interval entry or by a connected module

The screenshot shows the 'Txfile #0 Transmit' configuration window. It has a blue title bar with standard window controls. The window is divided into several sections:

- File Information:** Contains fields for 'Filename:', 'Start pos: 0', 'Blocksize: 0', and a 'Reverse order' checkbox.
- File Read Mode:** Contains radio buttons for 'Offset', 'Sync', 'Length', and 'Log file'. The 'Log file' option is selected. There are also checkboxes for 'Use log file timing' and 'Define times'. Below these are input fields for 'Offset: 0', 'Size:', 'Pattern:', 'Bit pos:', 'No. of bits:', and 'Adjustment:'. At the bottom of this section are time selection fields for 'Start' and 'Stop' in Year, Day, Hour, Min, Sec, and Msec.
- Output Mode:** Contains radio buttons for 'Manual', 'Auto-Complete File', and 'Auto-Blocks'. The 'Auto-Blocks' option is selected. There are input fields for 'Cycles: 0', 'Blocks Read: 0', and 'Blocks Sent: 0'. Below these is an 'Interval: 2000 msec' field.
- Operation:** Contains buttons for 'Load', 'Send', 'Continuously', and 'Stop'.

At the bottom of the window are 'Apply' and 'Close' buttons. A green arrow points from the text on the left to the 'Auto-Blocks' radio button.

Transmitting NASCOM Blocks from a File

A file of block data has been selected.

The block size is 600 bytes.

The Offset 600 bytes.

The module is configured for Auto-Complete File Mode

The file will play once and then stop.

Each block will be sent 50 msec after the previous block.

The screenshot shows a Windows-style dialog box titled "Txfile #0 Transmit". It contains several sections for configuring file transmission:

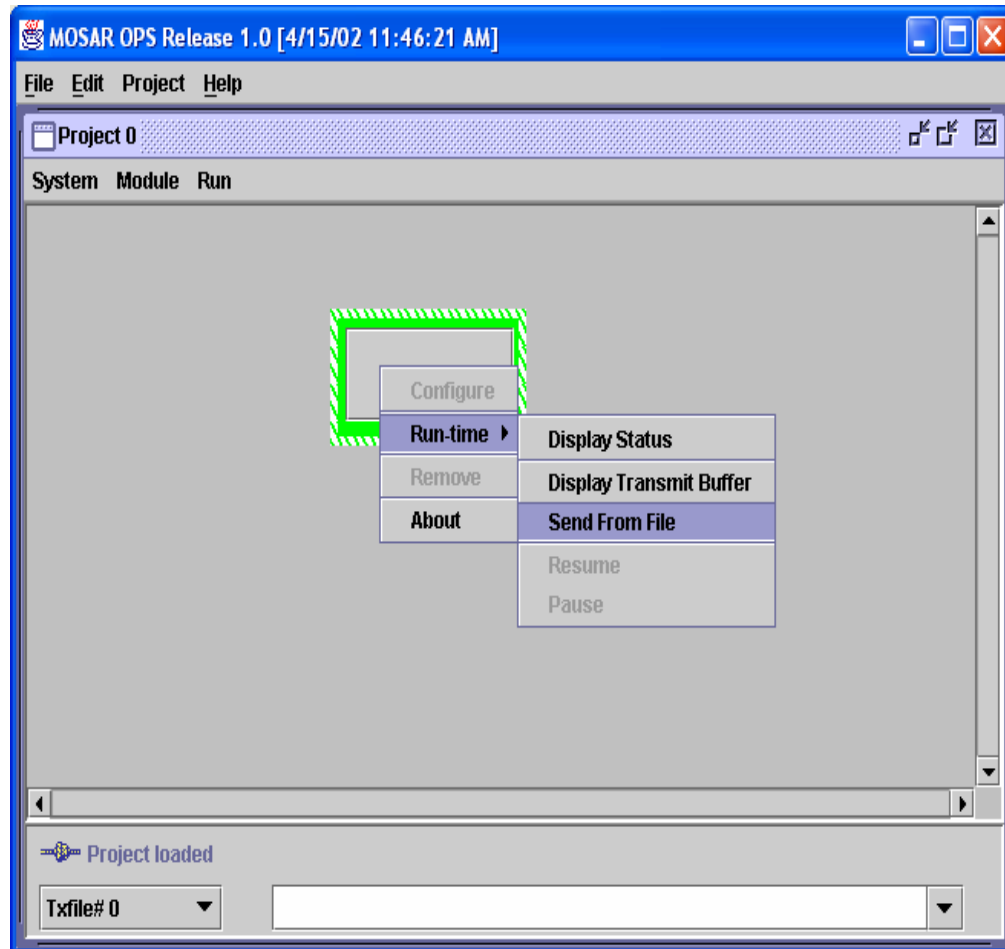
- File Information:** Includes fields for "Filename:" (C:\tslogs\ssme.txt1), "Start pos:" (0), "Blocksize:" (600), and a "Reverse order" checkbox.
- File Read Mode:** Features radio buttons for "Offset" (selected), "Sync", "Length", and "Log file". The "Offset" section has fields for "Offset:" (600), "Size:", "Pattern:", "Bit pos:", "No. of bits:", and "Adjustment:". The "Log file" section includes checkboxes for "Use log file timing" and "Define times", followed by "Start:" and "Stop:" time pickers (Year, Day, Hour, Min, Sec, Msec).
- Output Mode:** Includes radio buttons for "Manual", "Auto-Complete File" (selected), and "Auto-Blocks". It also has fields for "Cycles:" (1), "Blocks Read:" (0), "Blocks Sent:" (0), and "Interval:" (50 msec).
- Operation:** Contains buttons for "Load", "Send", "Continuously", and "Stop".

At the bottom of the dialog are "Apply" and "Close" buttons.

TXFILE Run Time Display

The user is offered the standard selections.

Use the Send From File to open the transmit window.



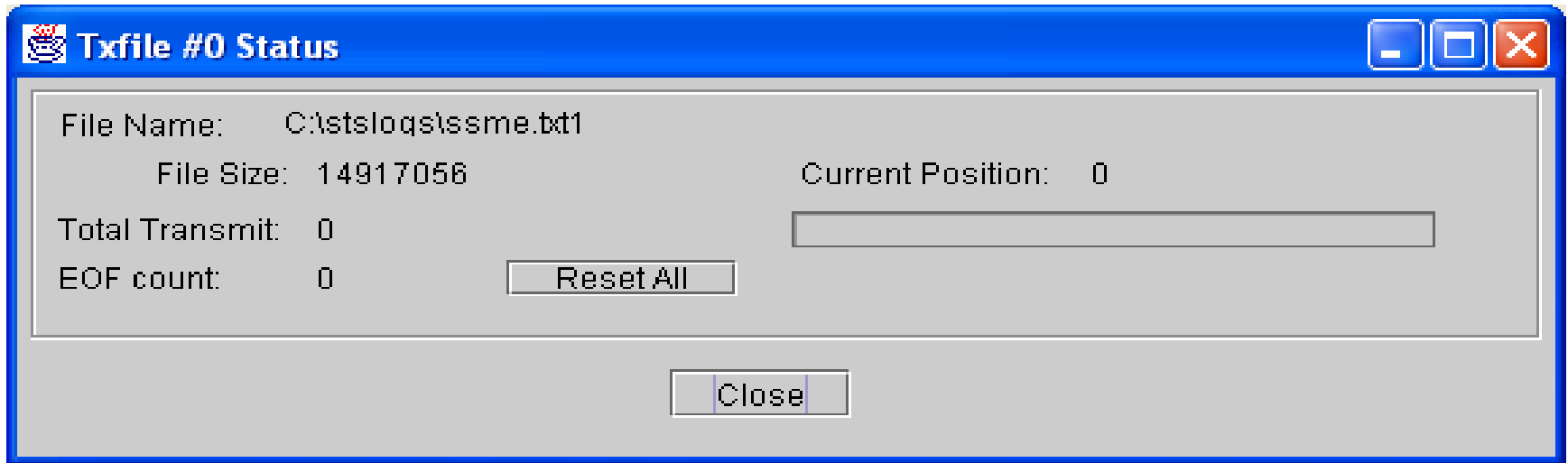
TXFILE- Send from File Display

This display is the same window used to configure the module. The difference is now the Send and Stop Buttons are now accessible. For our example, pressing the Send button will start the file playing.

The screenshot shows the 'Txfile #0 Transmit' window with the following sections and controls:

- File Information:**
 - Filename: C:\tslogs\ssme.txt1
 - Start pos: 0
 - Blocksize: 600
 - ☐ Reverse order
- File Read Mode:**
 - ☒ Offset: Offset: 600
 - ☐ Sync: Size: Pattern:
 - ☐ Length: Bit pos: No. of bits: Adjustment:
 - ☐ Log file: ☐ Use log file timing ☐ Define times
 - Start: 0 0 0 0 0 0 (Year, Day, Hour, Min, Sec, Msec)
 - Stop: 0 0 0 0 0 0 (Year, Day, Hour, Min, Sec, Msec)
- Output Mode:**
 - ☐ Manual
 - ☒ Auto-Complete File: Cycles: 1
 - ☐ Auto-Blocks: Blocks Read: 0 Blocks Sent: 0
 - Interval: 50 msec
- Operation:**
 - Buttons: Load, Send, Continuously, Stop
- Footer:**
 - Buttons: Apply, Close

TXFILE – Status Display



This display provides the user the following information

File Name Selected

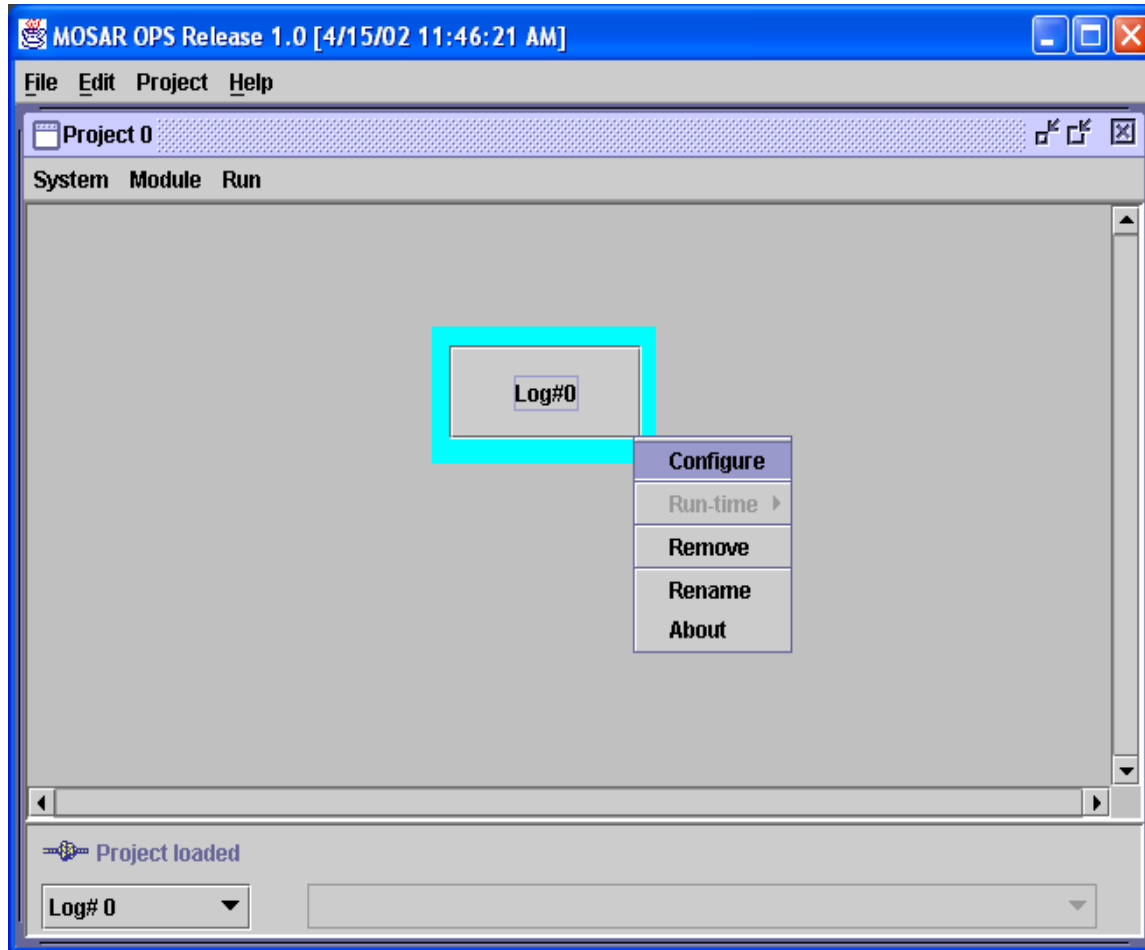
File Size

Total Transmit (Number of bytes transmitted)

EOF Count (Number of times the file has reached the end and started again)

Current Position

Log Module



Log Module is a can be configured in either mode
It has 1 Input Channel and no Output Channels.

Log Module Configuration Display

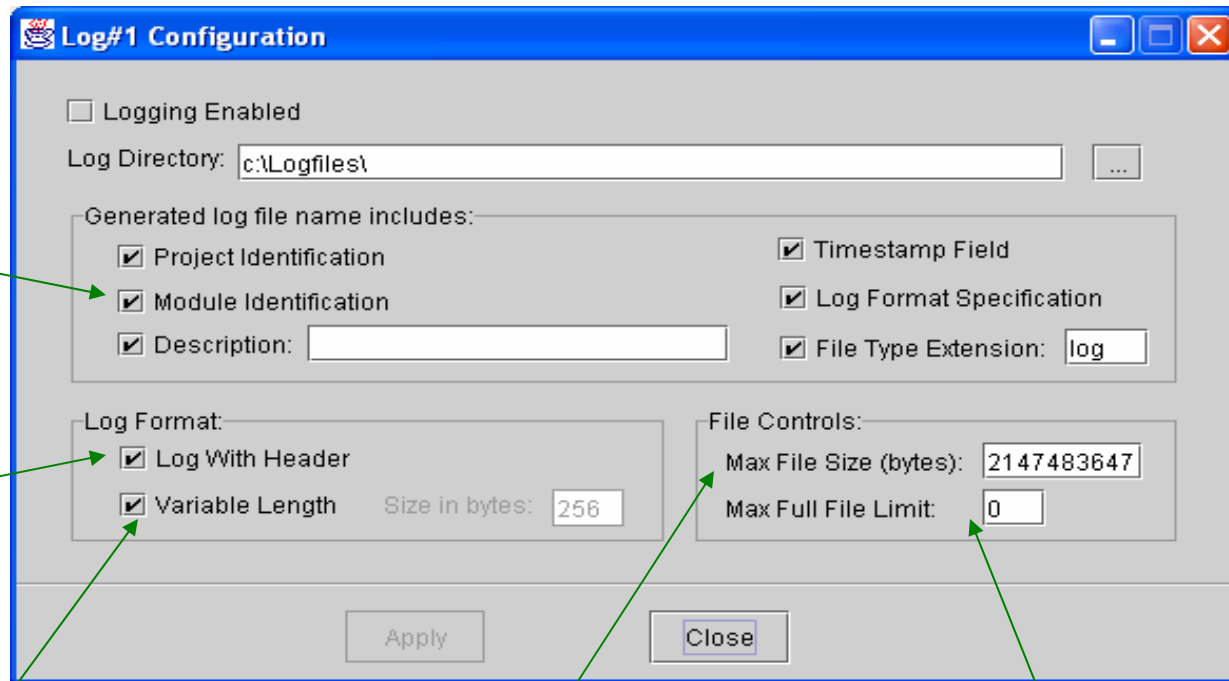
Allows the user to enter the name of the file to be logged. This is explained on the next slide.

Applies a header to the data that has block size and time. This is very useful when using Txfile to play the data back.

Allows for inputs of varying block lengths. This is the preferred method of operation

Allows the user to specify the maximum size of file to open for logging.

When Max File Size is reached, this field will control whether a new file will be opened



The image shows a Windows-style dialog box titled "Log#1 Configuration". It has a blue title bar with standard minimize, maximize, and close buttons. The main area is light gray and contains several configuration options:

- ☐ Logging Enabled
- Log Directory: ...
- Generated log file name includes:
 - ☒ Project Identification
 - ☒ Module Identification
 - ☒ Description:
 - ☒ Timestamp Field
 - ☒ Log Format Specification
 - ☒ File Type Extension:
- Log Format:
 - ☒ Log With Header
 - ☒ Variable Length Size in bytes
- File Controls:
 - Max File Size (bytes):
 - Max Full File Limit:

At the bottom, there are two buttons: "Apply" and "Close".

Log Module File Naming Convention

- Project Identification
 - This check box puts the project name as the first part of the file name.
- Module Identification
 - This Check box puts the module name in the second part of the file name.
- Description
 - This check box allows the user to provide a text entry to be inserted into the file name
- Time Stamp Field
 - This check box allows the user to add the system time to the file name
- Log File Specification
 - This check box add information on how the file was made. It allows the user to determine whether the Log Header and Variable length were used during the logging of the data.
- File Type Extension
 - This should either be **.log** or **.bin**.

Log Module Status Display

Location of the directory of the Log File

Log File Name
Note: See previous slide for naming conventions.

Directory: c:\Logfiles

Log File: Proj0_0_test_1008-153412_HV.log

Current Logging Statistics

Bytes Logged: 0	Limit File Count: 0
Records Logged: 0	Total File Count: 0
Records Truncated: 0	Reset

Logging Disabled

Open New Log

Format

Close

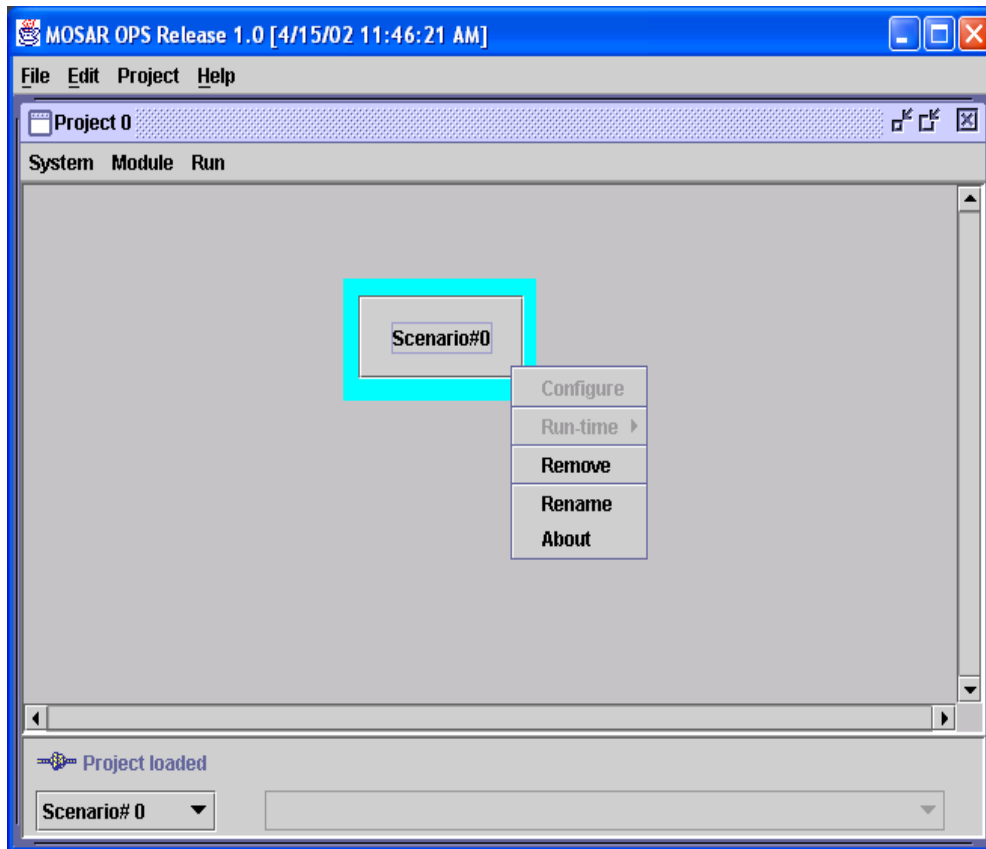
Logging is disabled when the project is started. This border will turn green when the module is logging data. Pressing thi will enable logging.

Pressing this will close the open file and create a new file with the time stamp updated.

Data Manipulation Modules

- Scenario
- TDMDemux
- TImMod
- Wrapper
- Test Module
- JSC CMD Encode

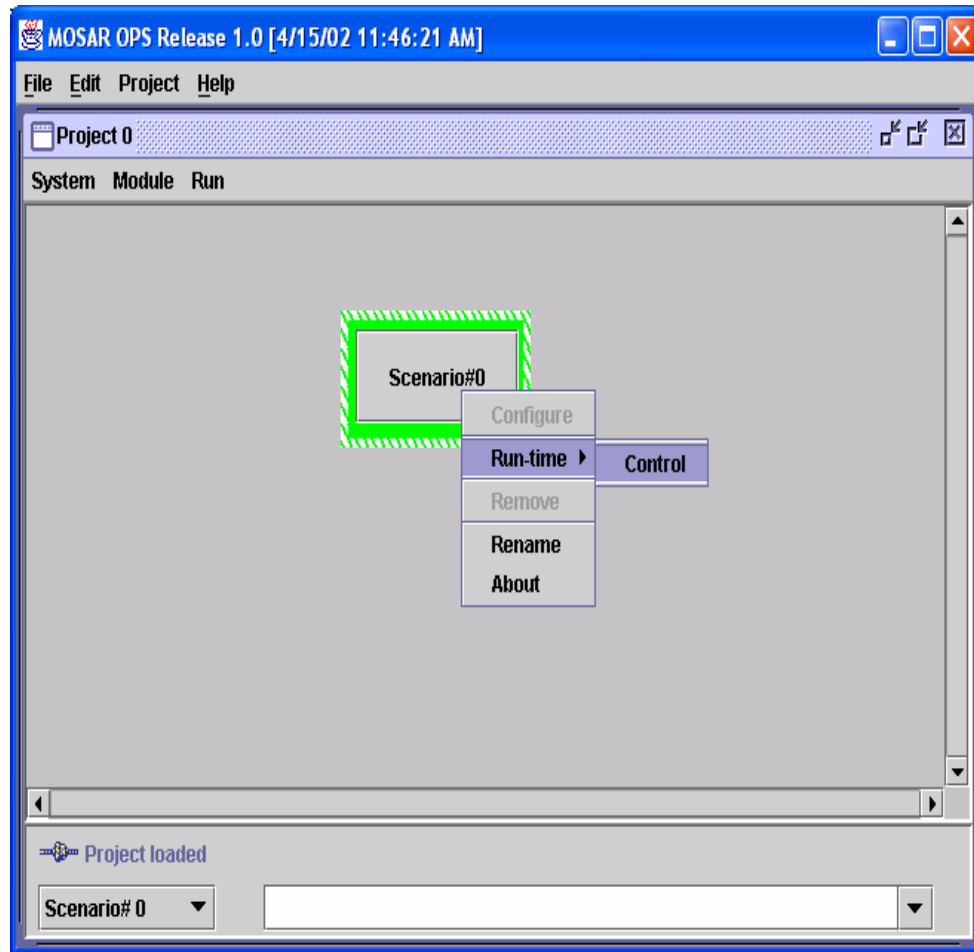
Scenario



The Scenario Module has no Input Channels and 1 Output Channel.

It is a Run-Time Configurable Module.

Scenario Run Time Display



Scenario Control Display

Enter the Name
of the Scenario
File

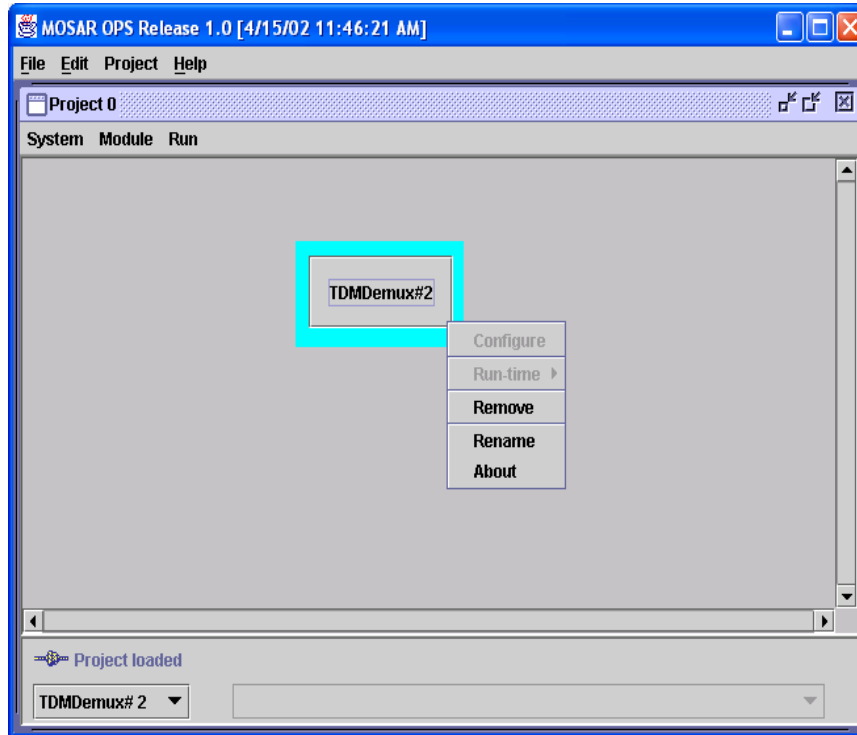
Access the
Standard File
Browser

When a file name
is selected the
Start button will be
enabled

When the Scenario is
running the **Pause**
button will be
enabled.

The screenshot shows a window titled "Scenario #0 Control" with a blue title bar and standard Windows window controls. Inside, there are five vertically stacked panels, each labeled "Scenario 1" through "Scenario 5" in blue text. Each panel contains a "Filename:" text box followed by a file selection icon (three dots). Below the filename box are labels for "Line No.:" and "Cur. Line:". At the bottom of each panel are two buttons: "Start" and "Pause". A "Close" button is located at the bottom center of the window. Green arrows point from the text annotations to specific elements: from "Enter the Name of the Scenario File" to the filename boxes of Scenarios 1, 2, 3, and 4; from "Access the Standard File Browser" to the file selection icons of Scenarios 1, 2, 3, and 4; from "When a file name is selected the Start button will be enabled" to the "Start" button of Scenario 4; and from "When the Scenario is running the Pause button will be enabled." to the "Pause" button of Scenario 5.

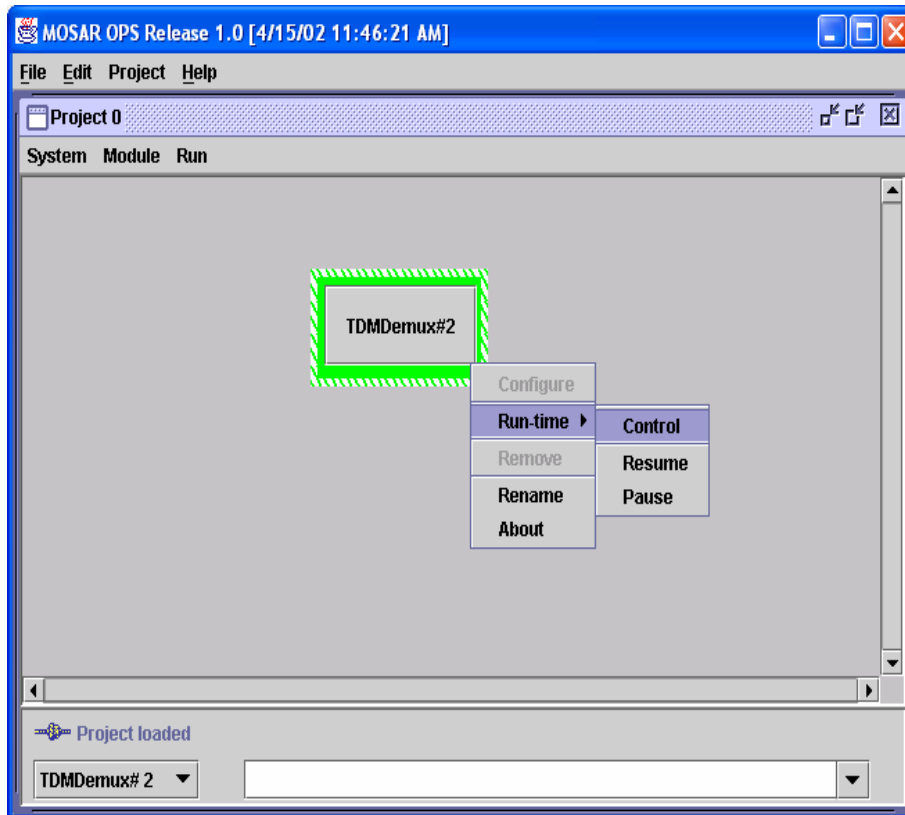
TDM Demux



TDMDemux has 1 input channel and 3 output channels.

This module is a Run Time configurable module

TDM Demux Run Time



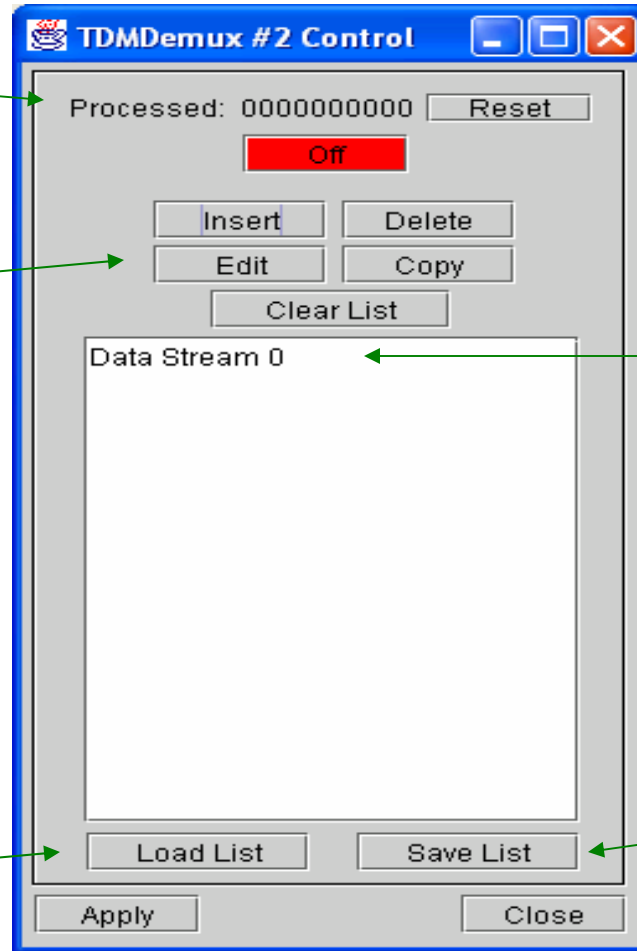
Use the down menus to open the control window. This also allows the user to start and atop the module.

TDM Demux Control Window

Displays the
number of packets
received

Use these buttons to
Add, Edit, Delete, or
Copy

Load a list of
previously saved
items.



When the Insert
button is clicked
This entry will
appear.

Save a list of data

TDM Demux Data Stream Definition Display

Allows the user to provide a name to the stream

Specify where the data will be output. Channel 1, 2, or 3

Byte to start extracting. Note the buffer starts with byte 0.

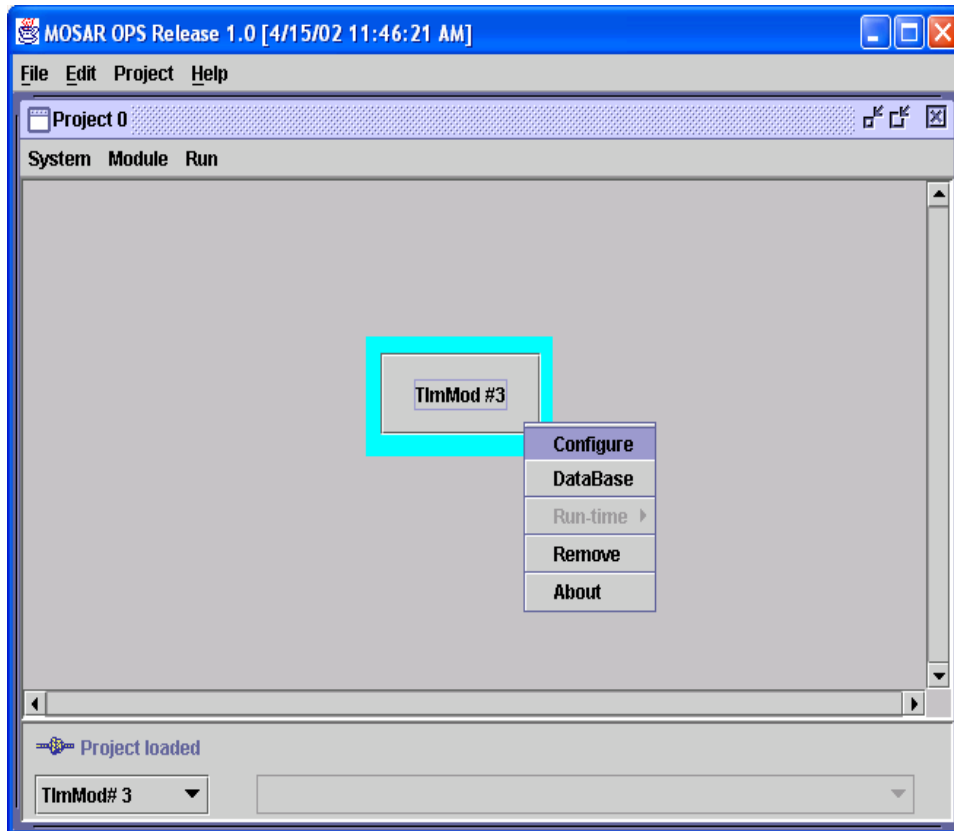
Number of bytes to extract.

The image shows a Windows-style dialog box titled "TDMDemux #2 Data Stream Definition". It has a blue title bar with standard minimize, maximize, and close buttons. The main area is light gray and contains four input fields: "Name:" (containing "Data Stream 0"), "Output Channel:", "Start Byte:", and "Size:". Each field is a white rectangle with a thin border. At the bottom of the dialog are two buttons: "Apply" on the left and "Close" on the right. Four green arrows point from external text labels to specific parts of the dialog: one to the "Name:" field, one to the "Output Channel:" field, one to the "Start Byte:" field, and one to the "Size:" field.

Field	Value
Name:	Data Stream 0
Output Channel:	
Start Byte:	
Size:	

Buttons: Apply, Close

TLMod



TLMod has 1 Input Channel and no Output Channels.

This module is a Non-Run Time configurable module.

TLMMOD Configuration Display

Enter the Frame Length in Bytes

The counter size in bits

Counter location byte #. The first byte of the frame is 0.

TlmMod #0 Configure

Minor Frame
Size: 0 Bytes

Counter
Size: 0 Bits
Location: 0 Byte
0 Bit

☐ Bit Flip

☐ Include CRC

Number of Bits
☐ 16 bits
☒ 32 bits

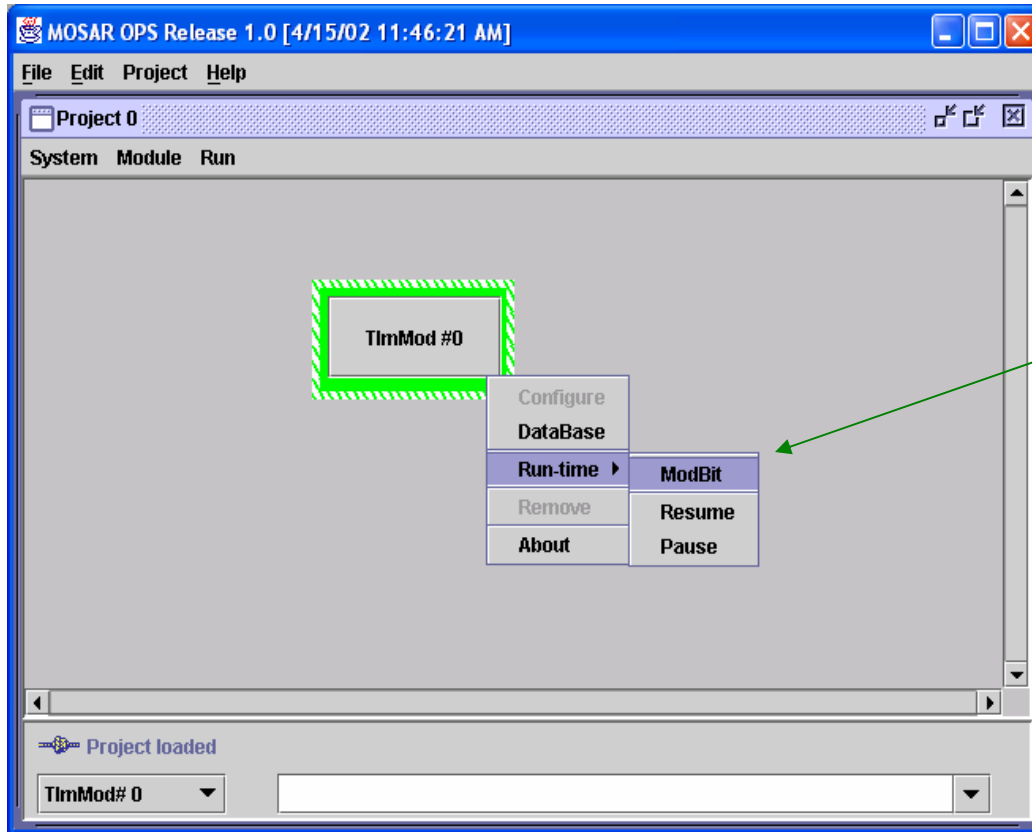
Init Value: 0

Polynomial: 10210000

Apply Close

Bit location to start at. The MSB is bit 0 the LSB is bit 7

TLMMOD Run Time



Using the drop down will allow the user to access the MODBIT window or Start Stop the module.

TLMMOD MODBIT Display

of frames between modification. For example 10 = every 10 frames

First Byte to modify in the frame

First bit to modify in the frame

of bits to change. Up to 32 bits

You must click apply for changes to be accepted

The first frame to modify

Checking this box enables the changes entered

New value to enter

The screenshot shows the 'TlmMod ModBit Status' window. It features a table with columns: Enable, Start Frame, Subcom, Start Byte, Start Bit, Bit Length, Value, Value Before Mod Byte, and Value After Mod Byte. The first row has values: 0, 1, 3, 0, 8, 04, 0, 00000000, 00000000. Below the table are buttons: Add, Remove, Remove All, Save, Clear Load, and Append Load. At the bottom, there are two 'Hex' dropdown menus, a 'Current Minor Frame Counter' set to 0, and a 'Close' button. Green arrows point from text labels to specific UI elements: 'Enable' to the first checkbox, 'Start Frame' to the '0' in the first row, 'Subcom' to the '1' in the first row, 'Start Byte' to the '3' in the first row, 'Start Bit' to the '0' in the first row, 'Bit Length' to the '8' in the first row, 'Value' to the '04' in the first row, 'Value Before Mod Byte' to the '0' in the first row, 'Value After Mod Byte' to the '00000000' in the first row, and 'Current Minor Frame Counter' to the '0' at the bottom.

Enable	Start Frame	Subcom	Start Byte	Start Bit	Bit Length	Value	Value Before Mod Byte	Value After Mod Byte
<input type="checkbox"/>	0	1	3	0	8	04	0	0
<input type="checkbox"/>							00000000	00000000
<input type="checkbox"/>							00000000	00000000

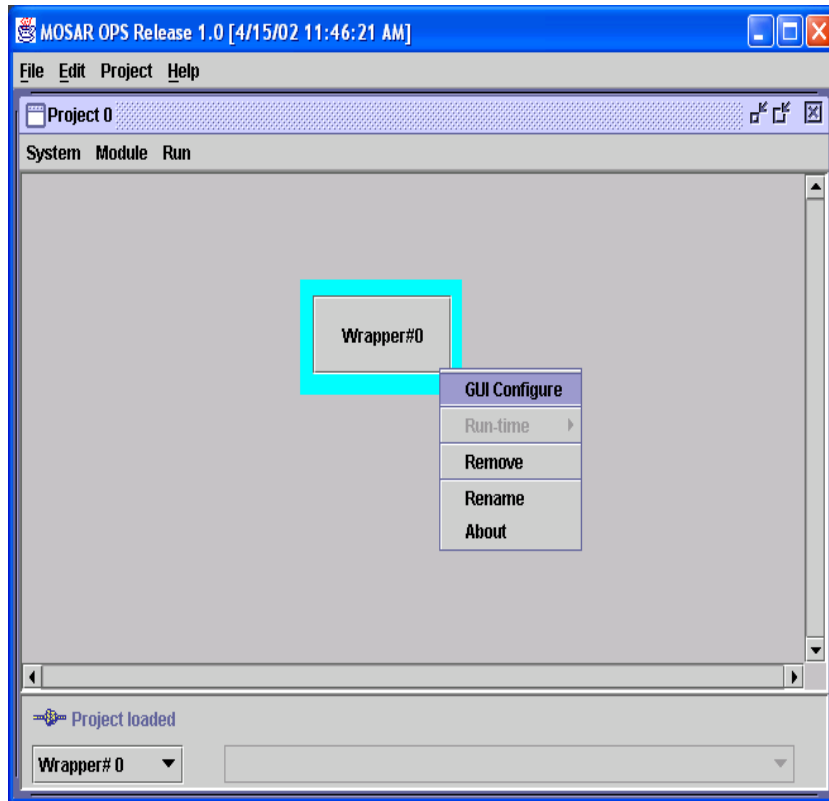
Buttons: Add, Remove, Remove All, Save, Clear Load, Append Load

Current Minor Frame Counter: 0

Close

Current minor frame being processed

Wrapper Module



The Wrapper Module has 1 Input Channel and 1 Output Channel.

It can be configured either during Run Time or Paused.

Wrapper GUI Configure

Add a RTP header to the block. This is used to insure data during IP transmissions

Select the Block Type

Specify the header information

Load a prebuilt header from the database.

Wrapper #0 Header Selection

Header Format Selection

☐ RTP Header ☐ Variable Length

Type

POCC-to-JSCCmd MDM JSCPD DSN GN Custom None

Nascom Header

SOURCE 001 Hex. ☒ Oct. ☐ Dec.

DEST CODE 273 Hex. ☒ Oct. ☐ Dec.

FORMAT ID 25 Hex. ☒ Oct. ☐ Dec.

SPACECRAFT ID 147 Hex. ☒ Oct. ☐ Dec.

DATA STREAM ID 377 Hex. ☒ Oct. ☐ Dec.

MESSAGE TYPE 152 Hex. ☒ Oct. ☐ Dec.

BLK SEQ CTR 2 0 Hex. ☒ Oct. ☐ Dec.

MESSAGE TYPE 0 Hex. ☒ Oct. ☐ Dec.

DEST CODE 0 Hex. ☒ Oct. ☐ Dec.

DATA LEN 574 Hex. ☐ Oct. ☒ Dec.

POCC to JSC Command Header

CMD MSG NUM 0 Hex. ☐ Oct. ☒ Dec.

VEHICLE ID 0 Hex. ☐ Oct. ☒ Dec.

CMD WD NUM 0 Hex. ☐ Oct. ☒ Dec.

CMD TYPE 0 Hex. ☒ Oct. ☐ Dec.

OR UPLK MODE 0 Hex. ☐ Oct. ☒ Dec.

Trailer

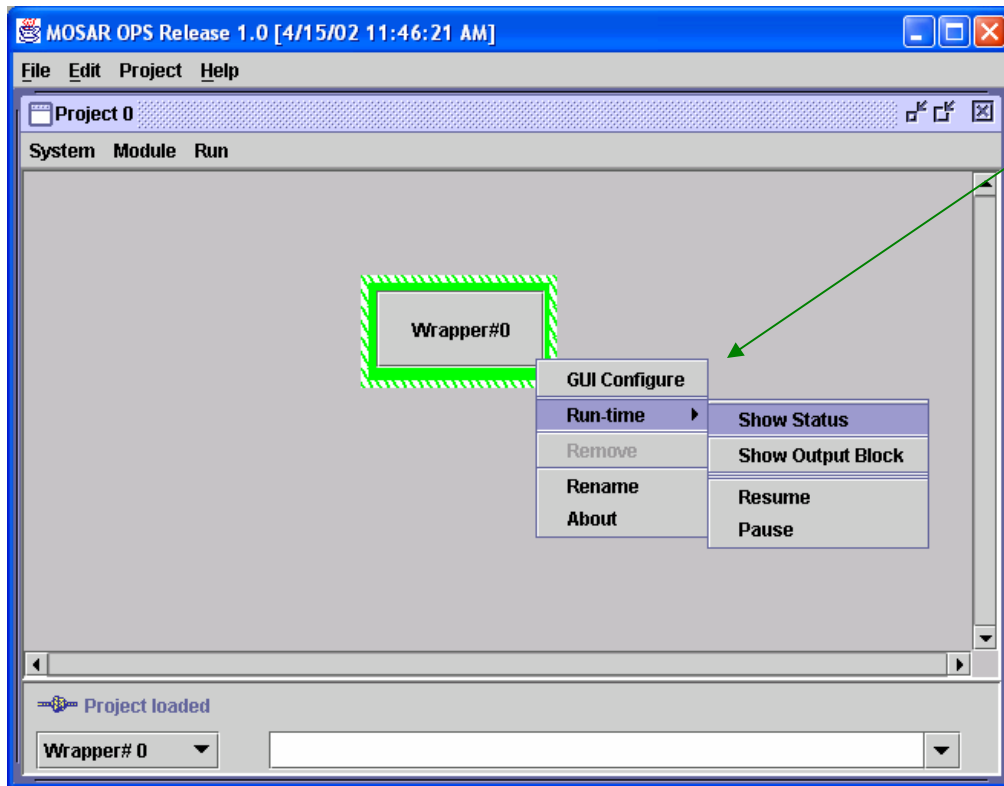
BLK SRL NUM 0 Hex. ☐ Oct. ☒ Dec.

Load Config File

Apply Close

Checking this box will place the incoming buffer of data into a block and transmit it immediately. If it is unchecked it will wait until it has enough data to equal the data length entry and then it will insert the data into a block and transmit it.

Wrapper Run Time



Access the GUI Configure
while the module is
running

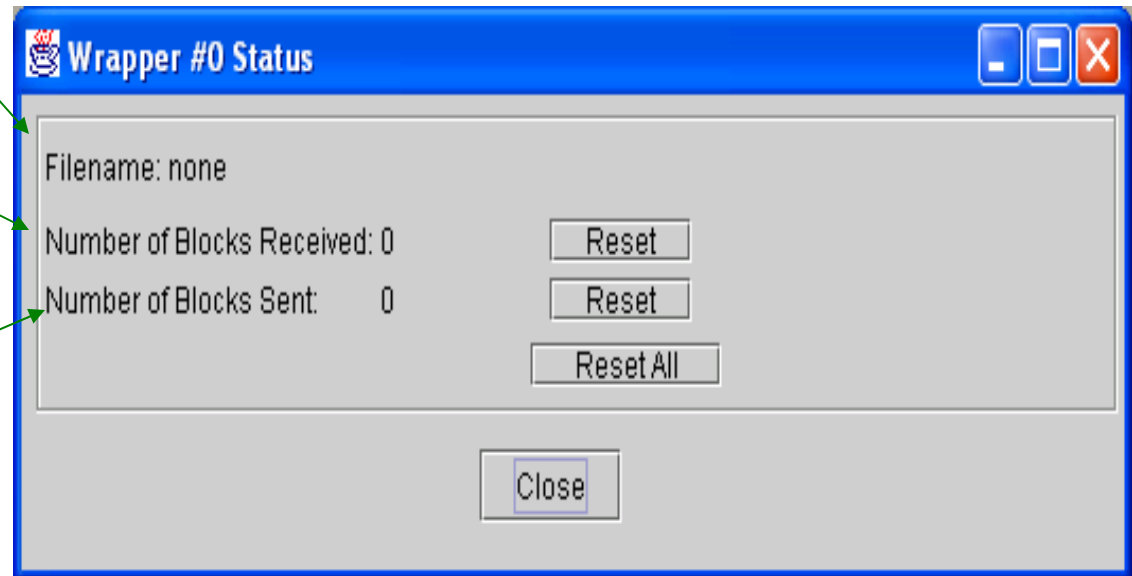
Accessing the drop down
window allows the user to
open the status display, the
raw data display or Start or
Stop the module.

Wrapper Status Display

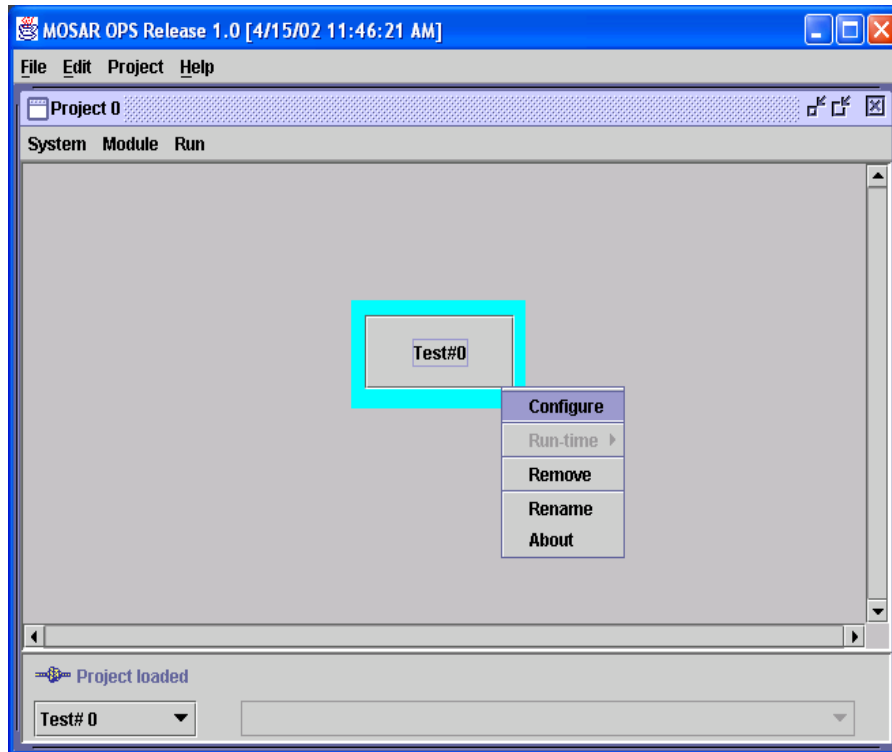
This will display the filename if a prebuilt header was used

Number of input buffers received.

Number of blocks transmitted

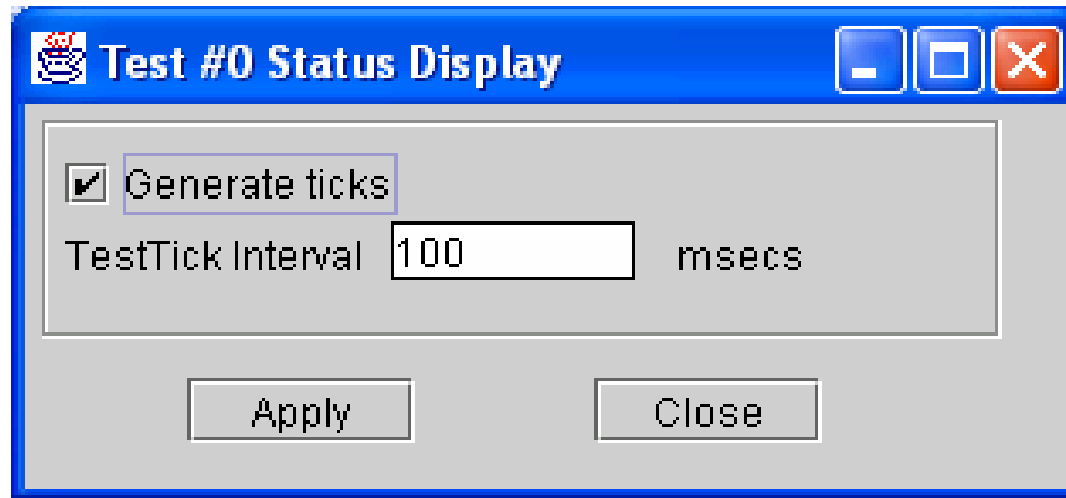


Test Module



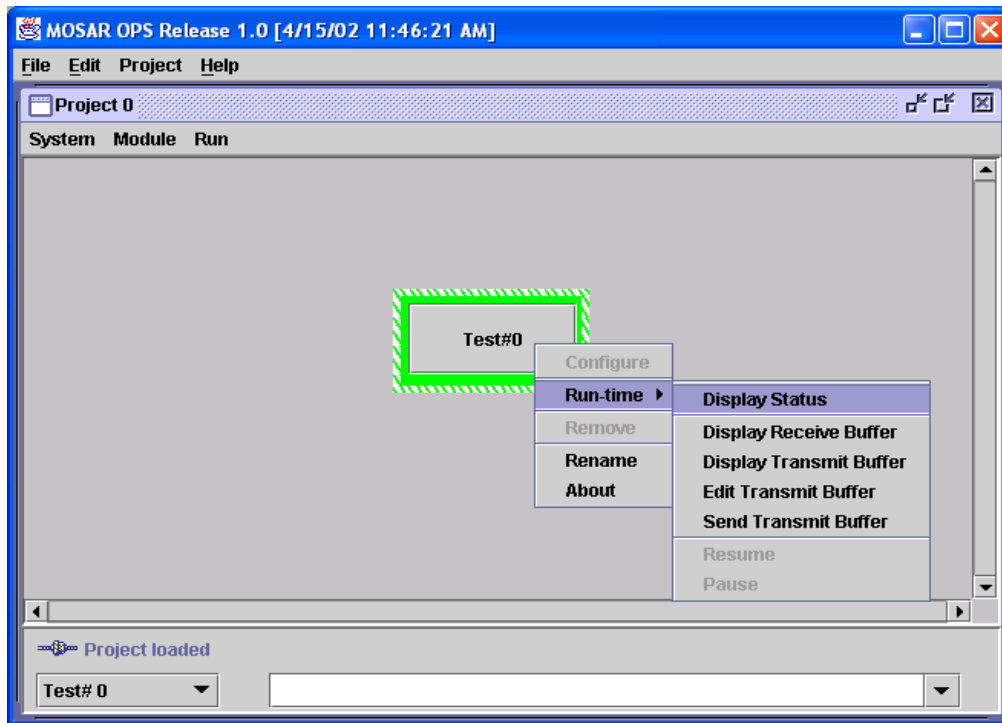
The Test Module has 1 Input Channel and 1 Output Channel
This module is a Non-Run Time configurable module.

Test Module Configuration



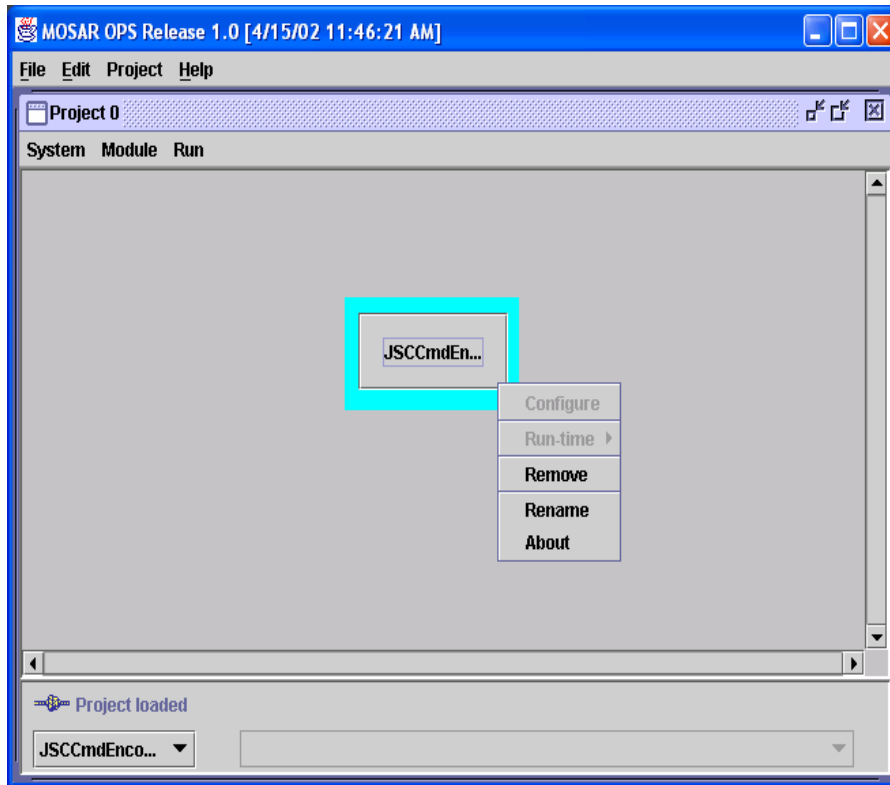
The Test Module generates “Ticks”. Ticks are software signals sent to the preceding module. They are most often used to tell a module when to send data. For example, Ticks can be used to tell TDMGen when to send data. The minimum interval is 10 msec.

Test Module Run Time



Accessing the drop down allows the user to display the status. It also allows the to display the raw buffers and edit some of the data.

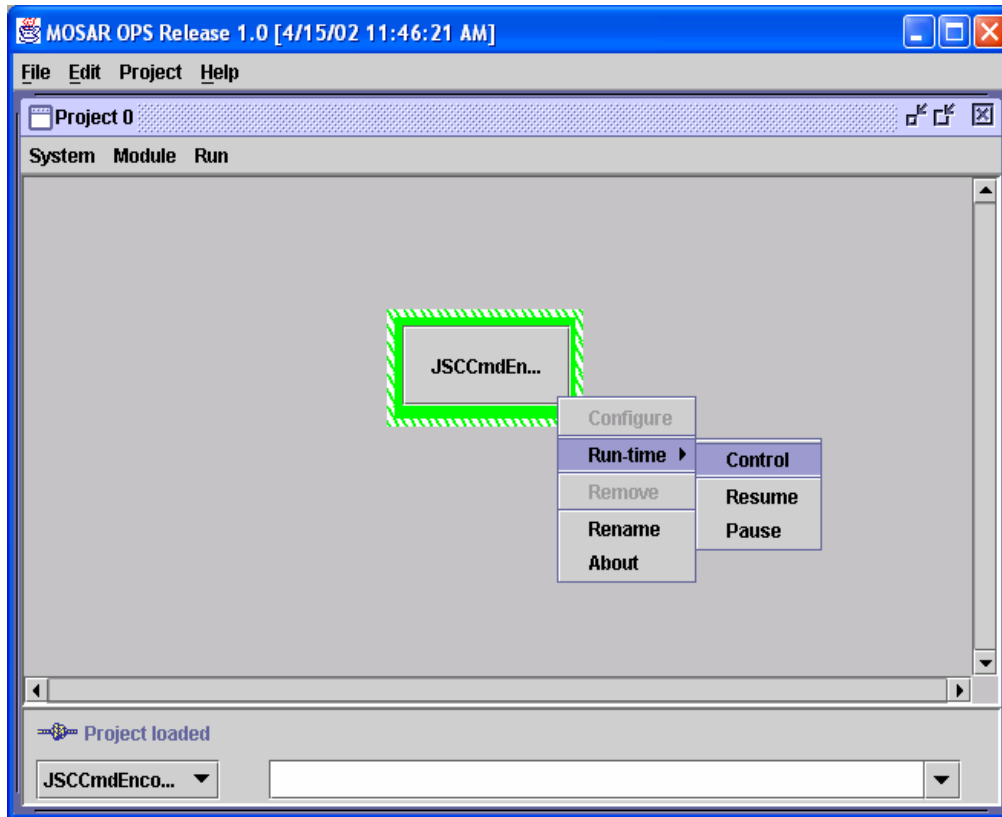
JSC CMD Encode



JSC CMD Encode has 1 Input Module and 1 Output Channel

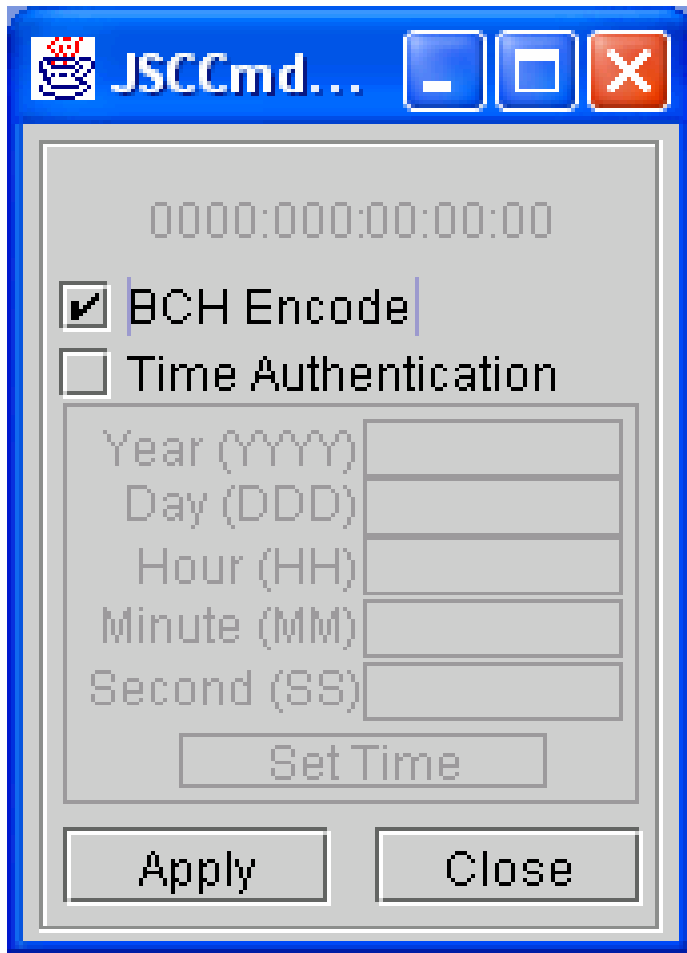
This module is a Run Time configurable module

JSC CMD Encode Run Time



The drop down allows the user to select the Control Display

JSC CMD Encode Control Window



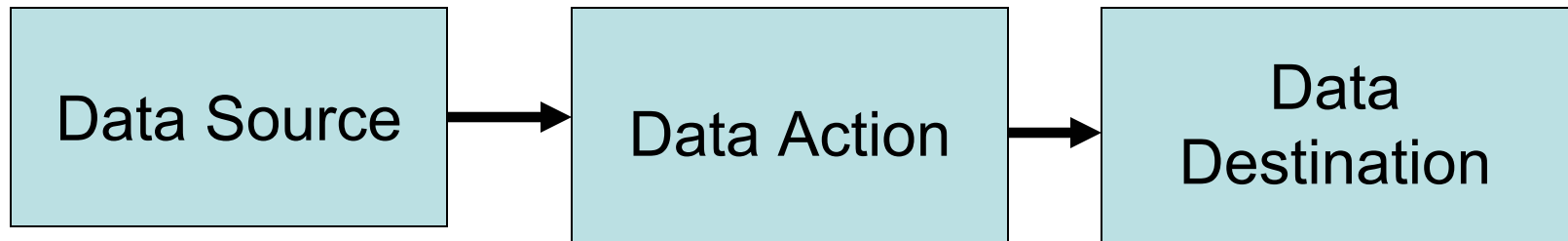
If the BCH Encode is selected the module will encode the incoming buffer.

Checking the Time Authentication will encode the time into the shuttle command. The time used is entered in the windows and will start when the Set Time is Clicked.

Examples

- The following will show some typical uses and how to build a project to perform a specified task.

Example 1: Receiving Telemetry and Storing to a File



What is the source
of the data?

What do I need to
do to the data?

Where is the
data going?

External Serial
Telemetry Stream

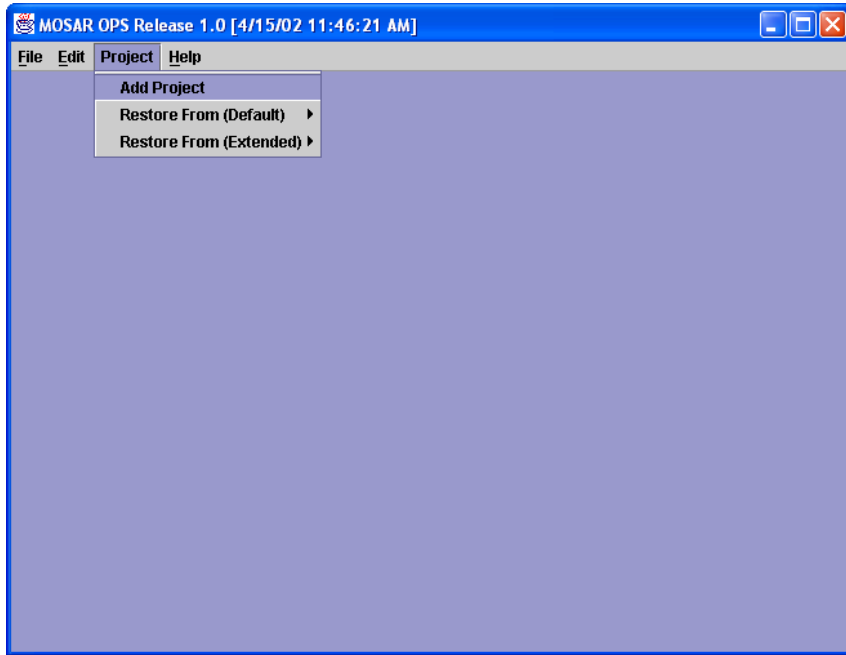
Verify the Frame
Integrity

Log to a File on
the Hard Drive

Starting a New Project

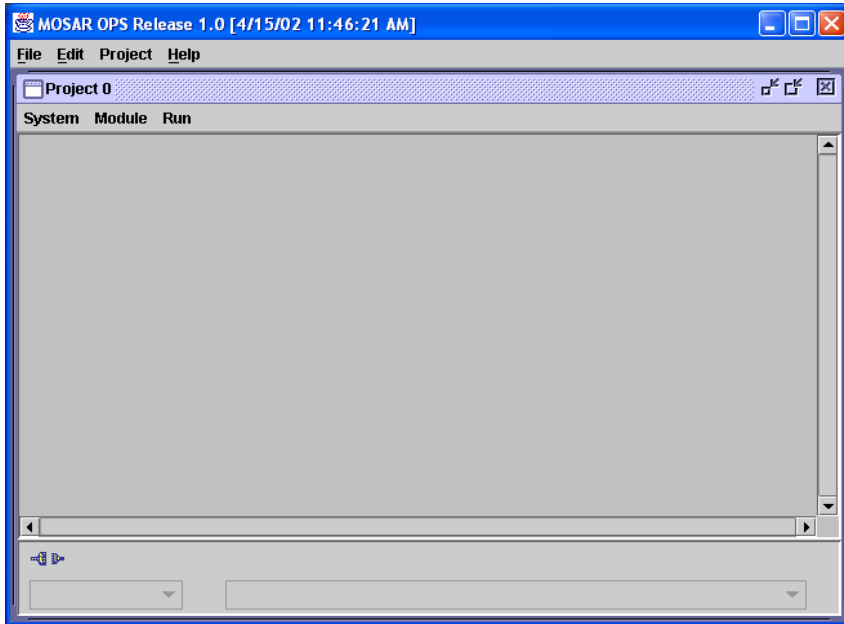
- Start the Server
- Start the Client
- You will see the Blank Client Window Open

Starting a New Project



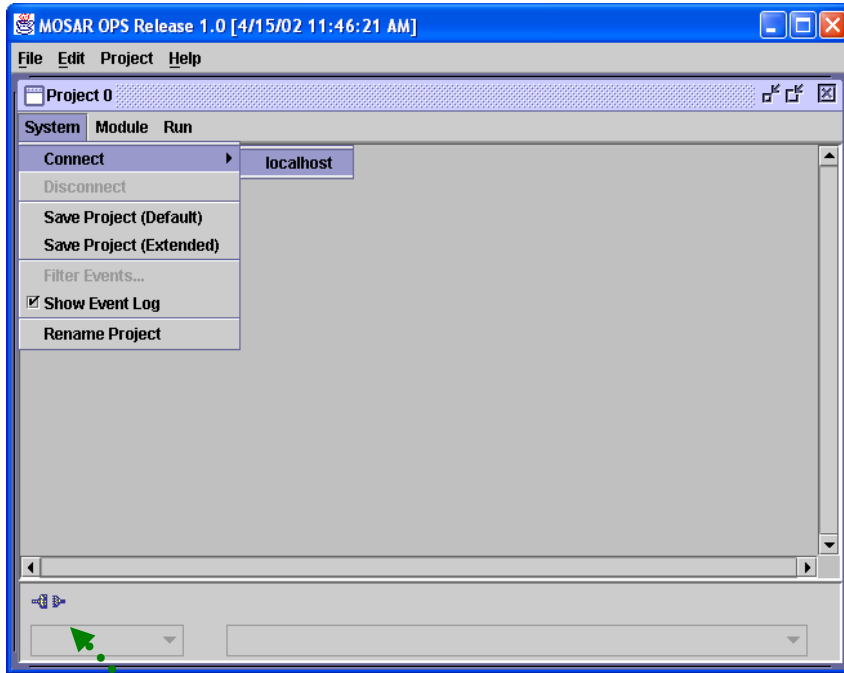
- Select Project
- Select Add Project

Starting a New Project



- The Project Window will be opened

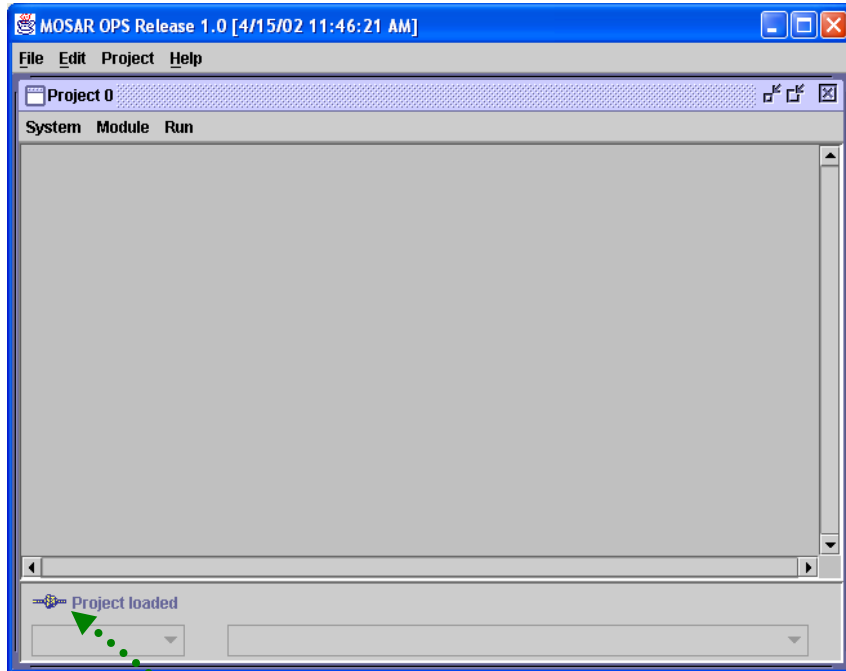
Starting a New Project



- Select System
- Select Connect
- Select Localhost

This symbol indicates
the project has not be
connected to the server

Starting a New Project



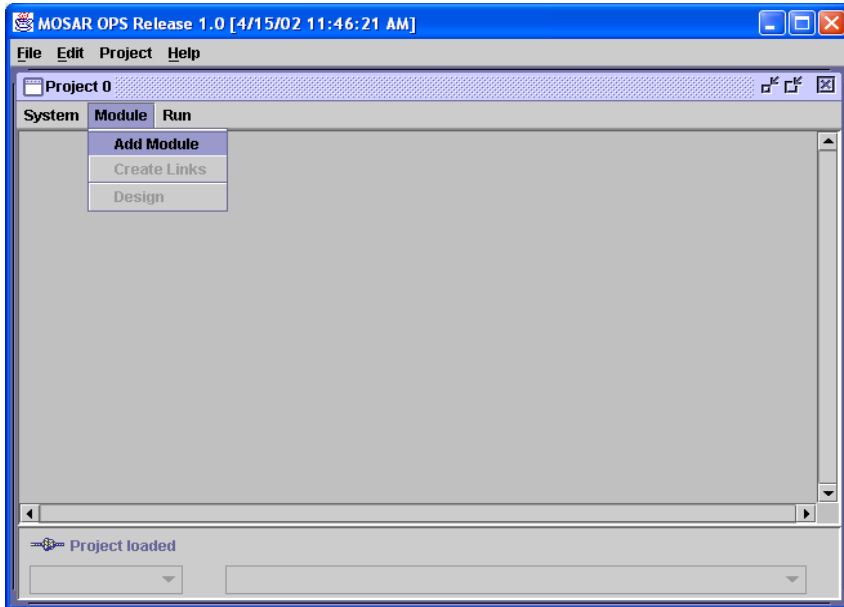
- At this point the project has been connected to the server and it is ready to add modules

This symbol indicates the project has been connected to the server

Adding Modules

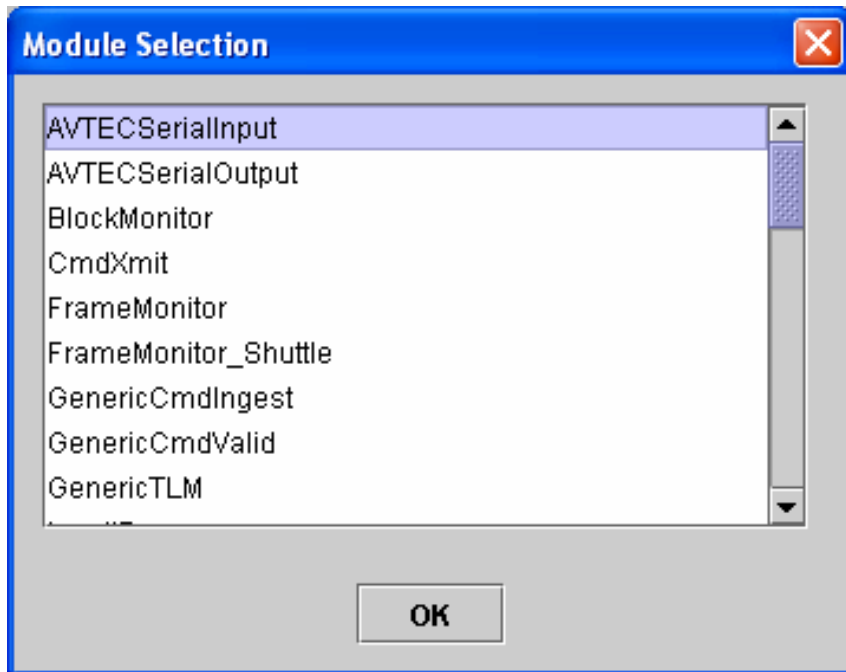
- From our example it has been determined that the following modules will be required
 - AVTEC Serial Input
 - Frame Monitor
 - LogModule

Adding Modules



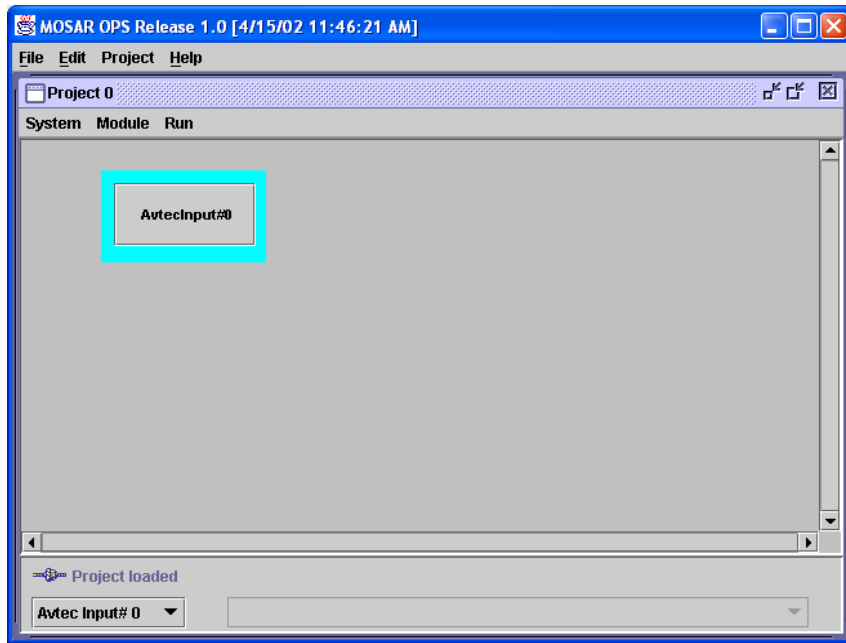
- Select Module
- Select Add Module

Adding Modules



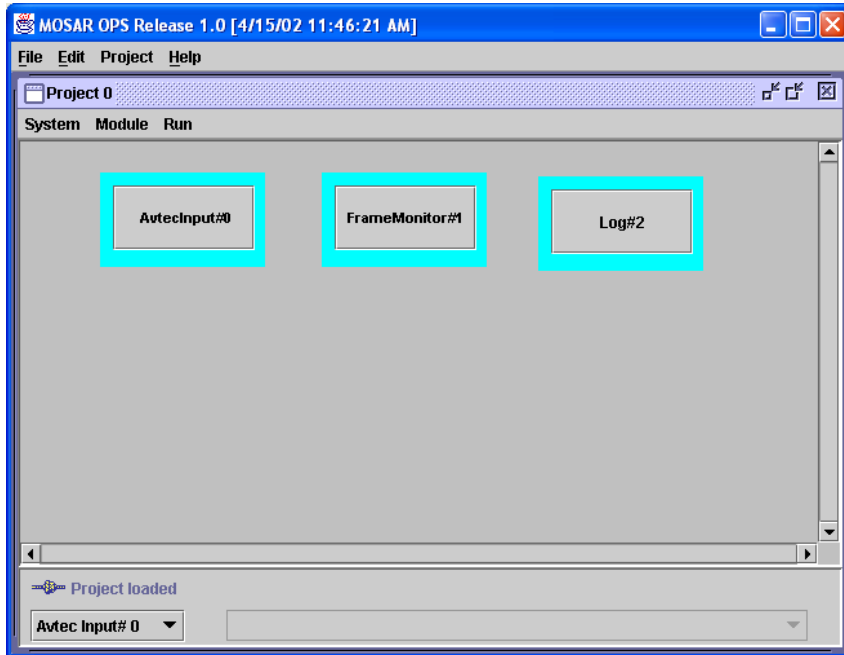
- The module selection window will open
- Scroll down to the desired module
- Select the module and click on OK
- The Module Selection window will close

Adding Modules



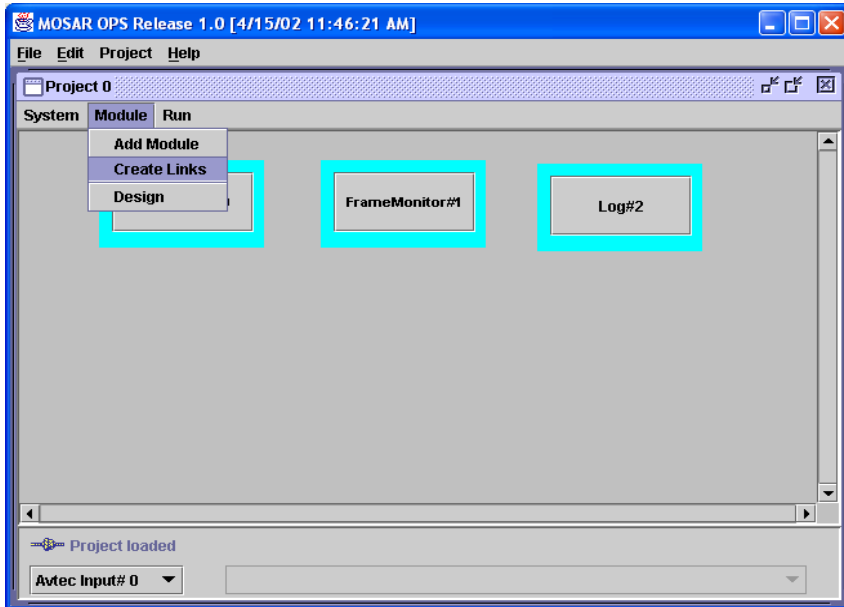
- Move the cursor to where on the project you want to place the module
- Left click and the module will appear on the project

Adding Modules



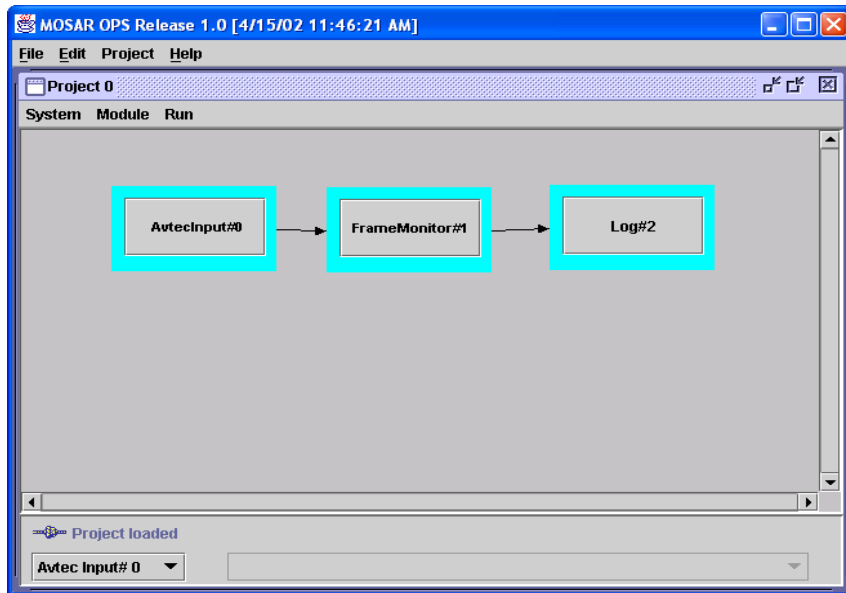
- Add the Frame Monitor and LogModule using the same procedures

Connecting Modules



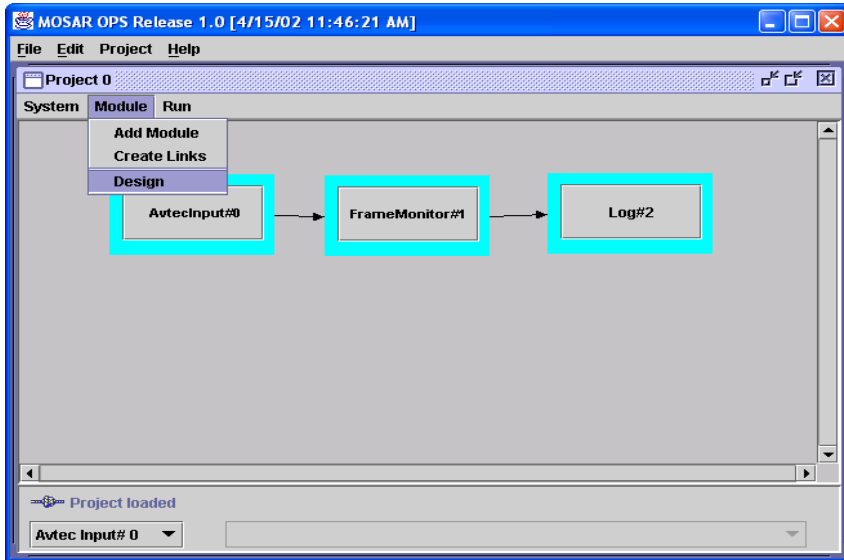
- Select Module
- Select Create Links

Connecting Modules



- Move cursor to module you would like to connect from
- Click and move the cursor to the module you would like to send the data to
- Click and an arrow head will appear indicating that the connection has been made

Connecting Modules



- When you have finished connecting the modules, Select Module and select Design
- This will take you out of the Create Links mode

Configuring the Modules

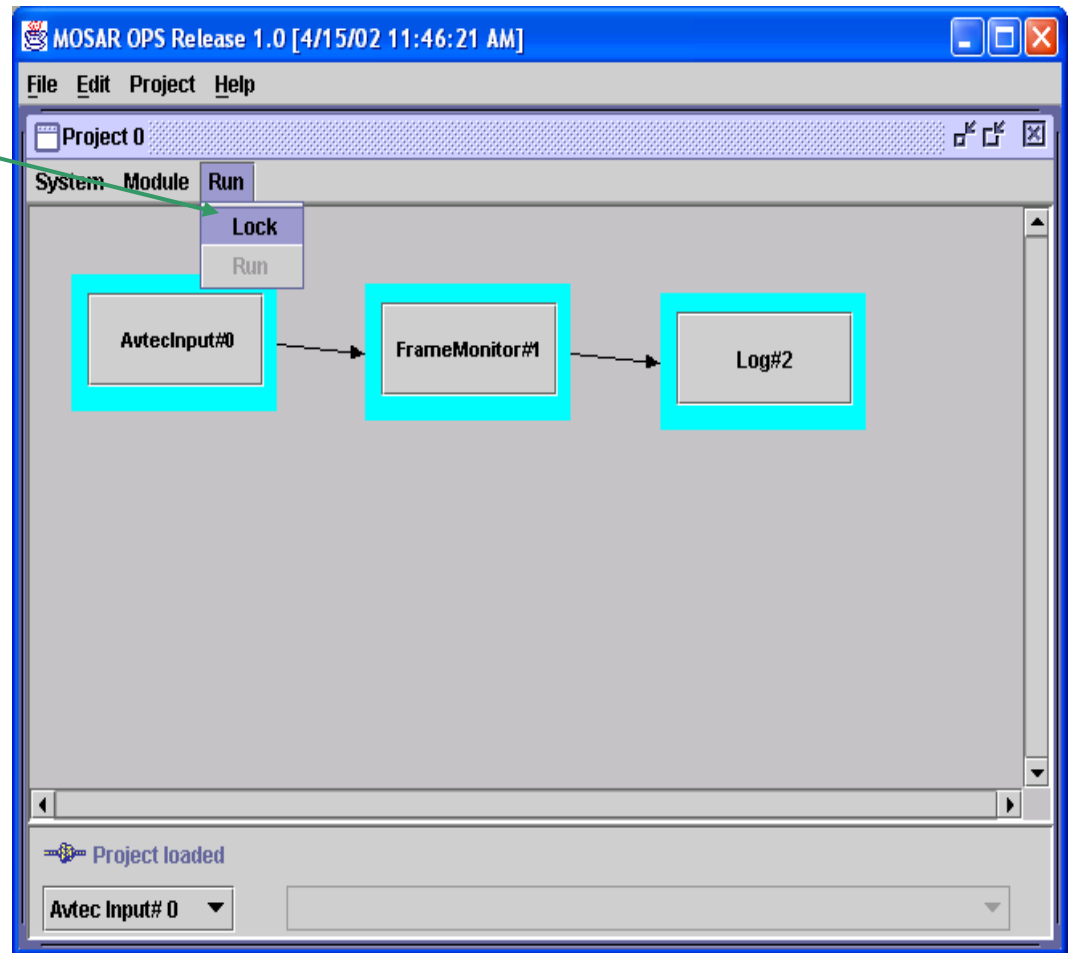
- Configure the modules using the configuration menus access from the drop down displays.
- Refer to the Users Guide and the Module notes for further information.

Running the Project

- After the modules have been added, the links between the modules made, and the modules configured you are ready to run the project.

Running the Project

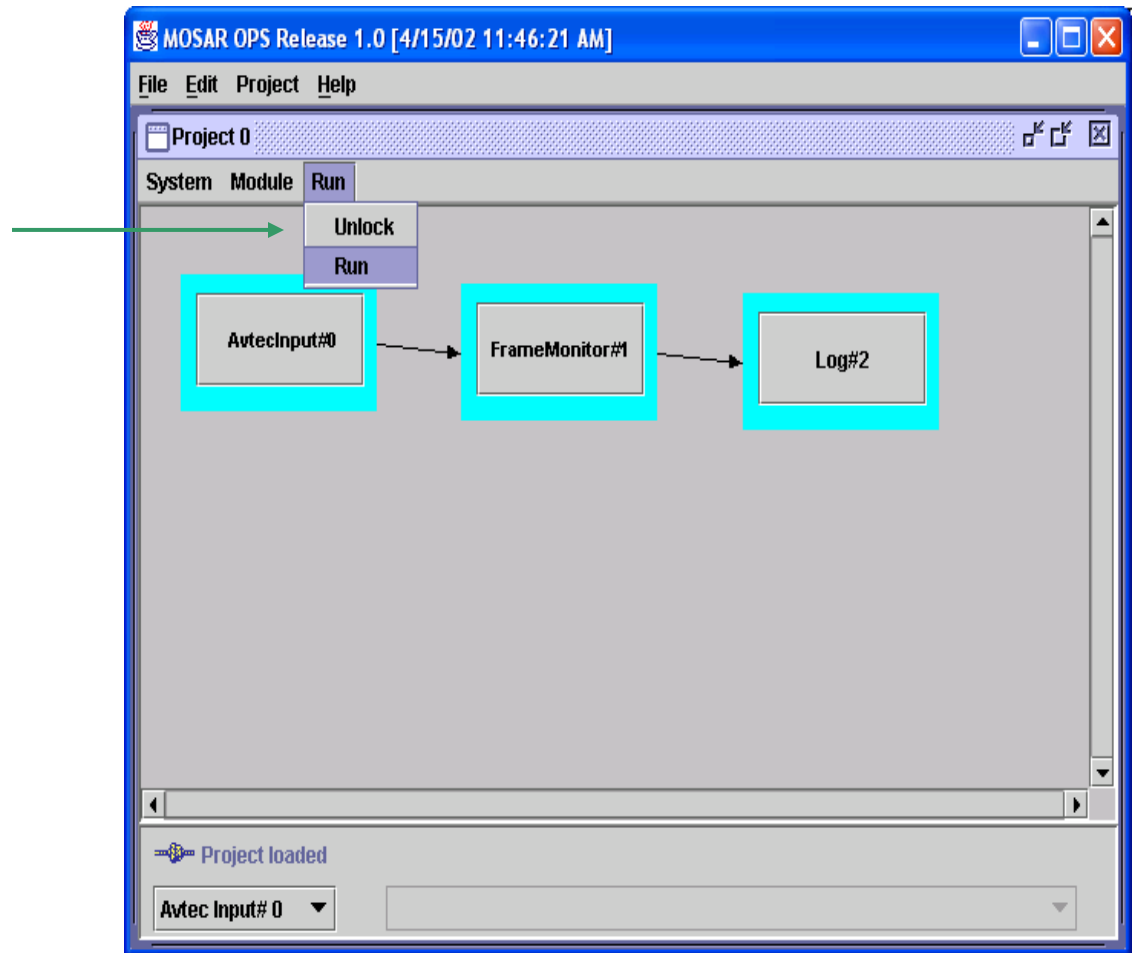
The first step is to click on **Run**. This will open the drop down menu. Select **Lock**. This will lock the project



Running the Project

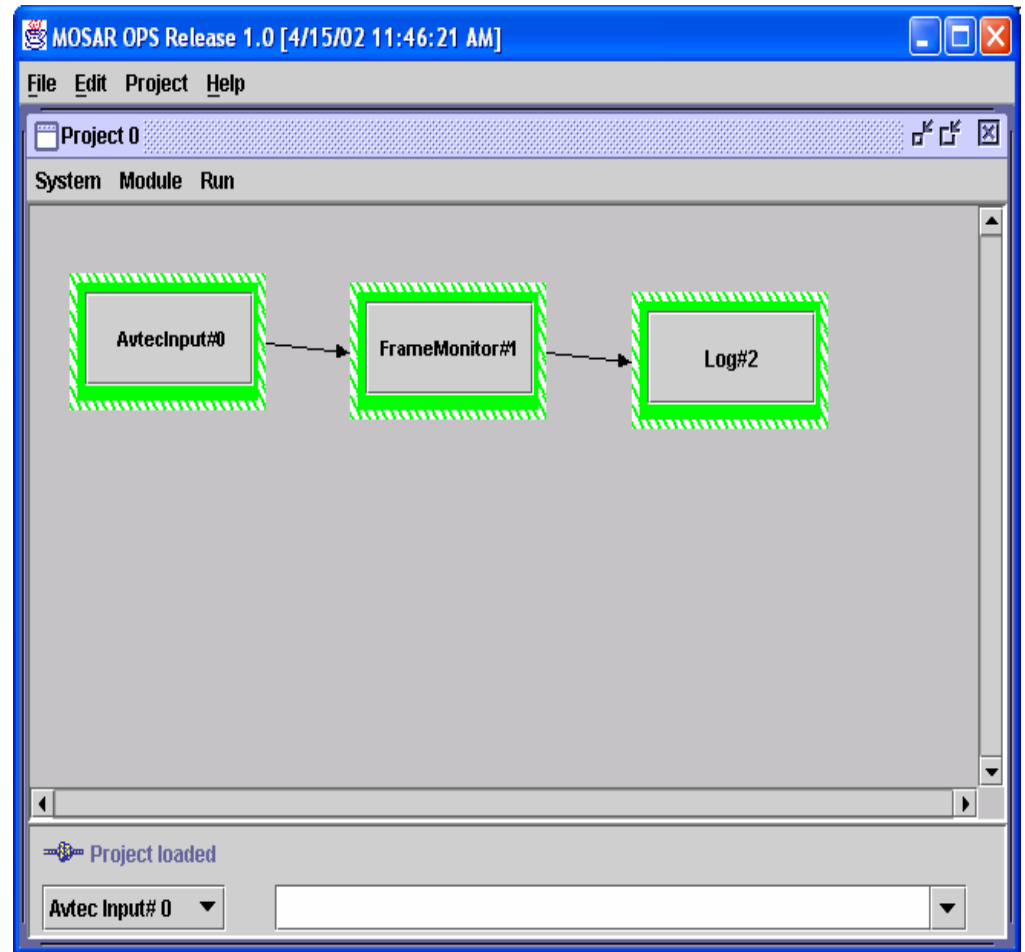
After locking the project, select **Run**. The drop down menu will open and the **Lock** will be replaced by **Unlock**. The modules can still be configured in this mode but the user can not add or remove modules or links while the project is locked.

When the user is ready clicking on **Run** will take the project to run mode.



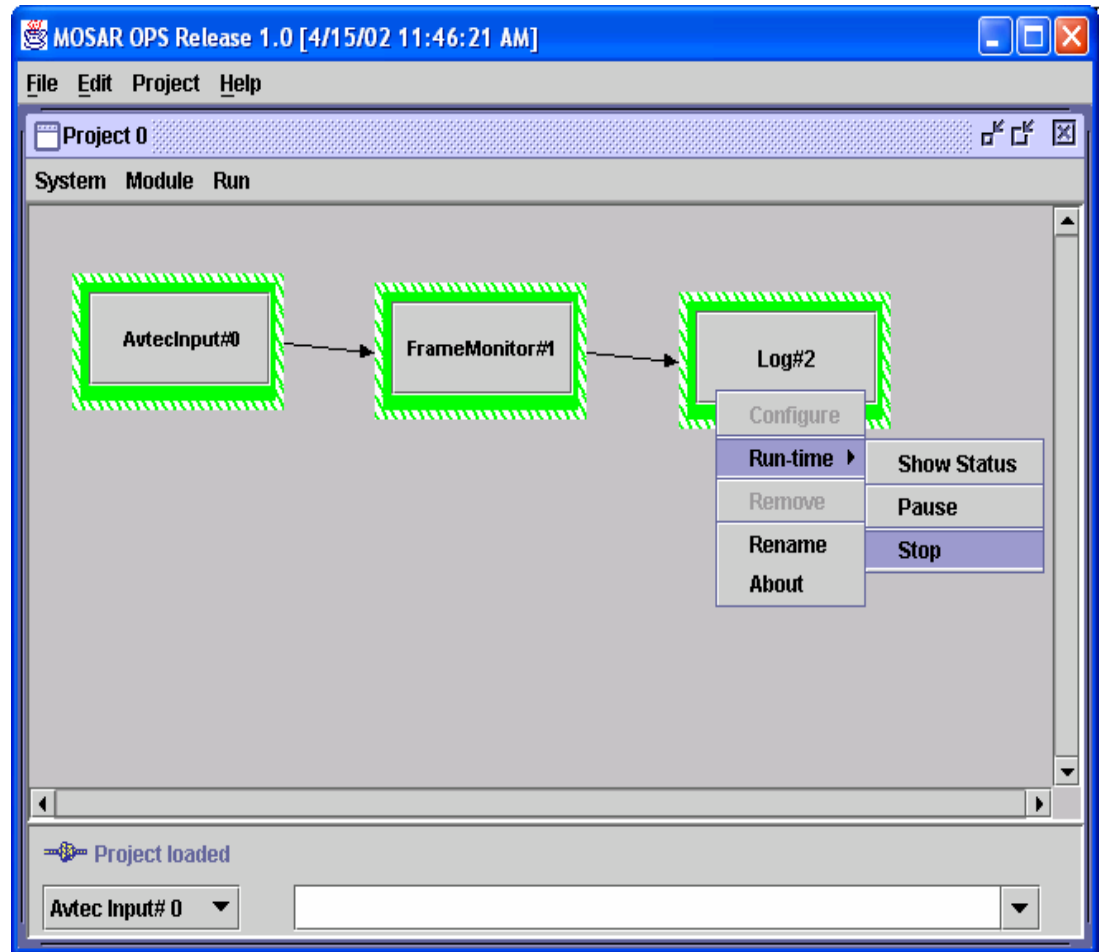
Running the Project

When the project is in run mode, the module boxes outline will change to green.

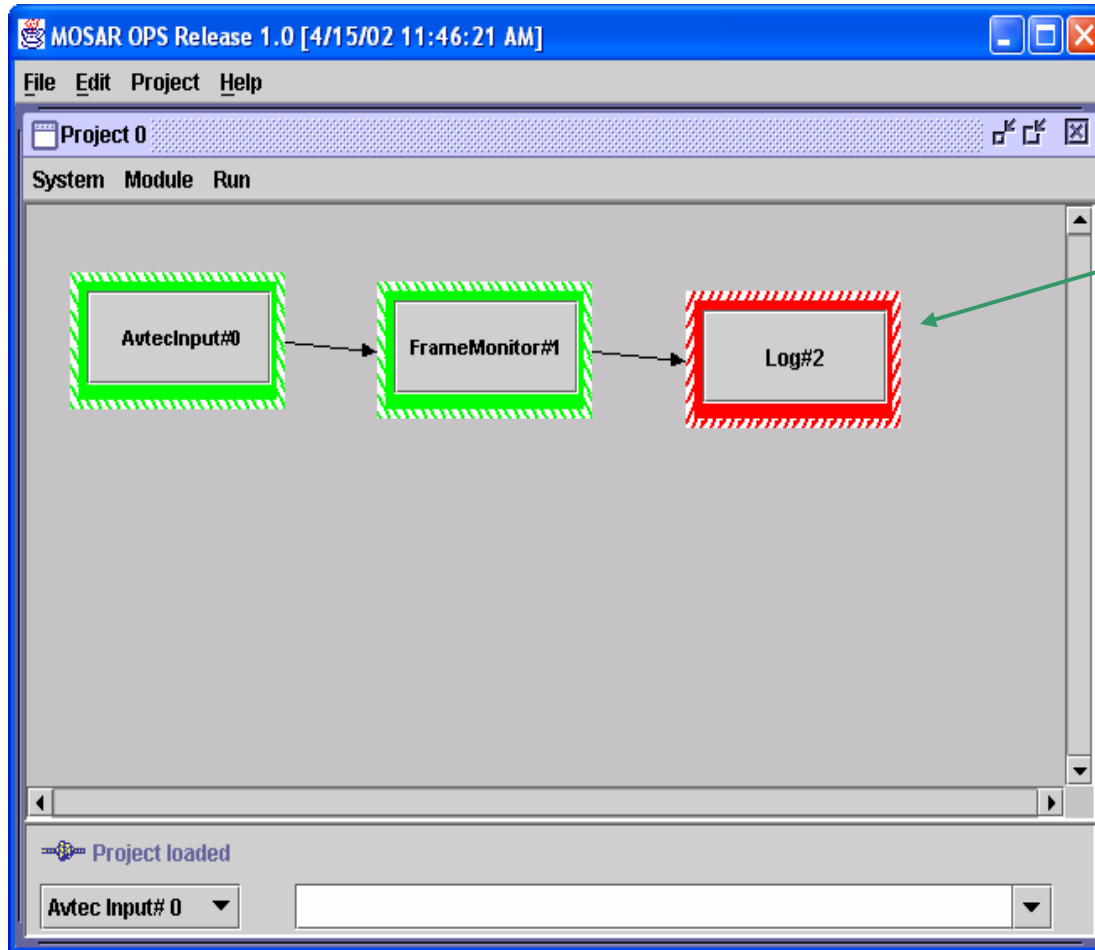


Running the Project

You can stop individual modules by accessing the drop down menu and clicking on **STOP**.

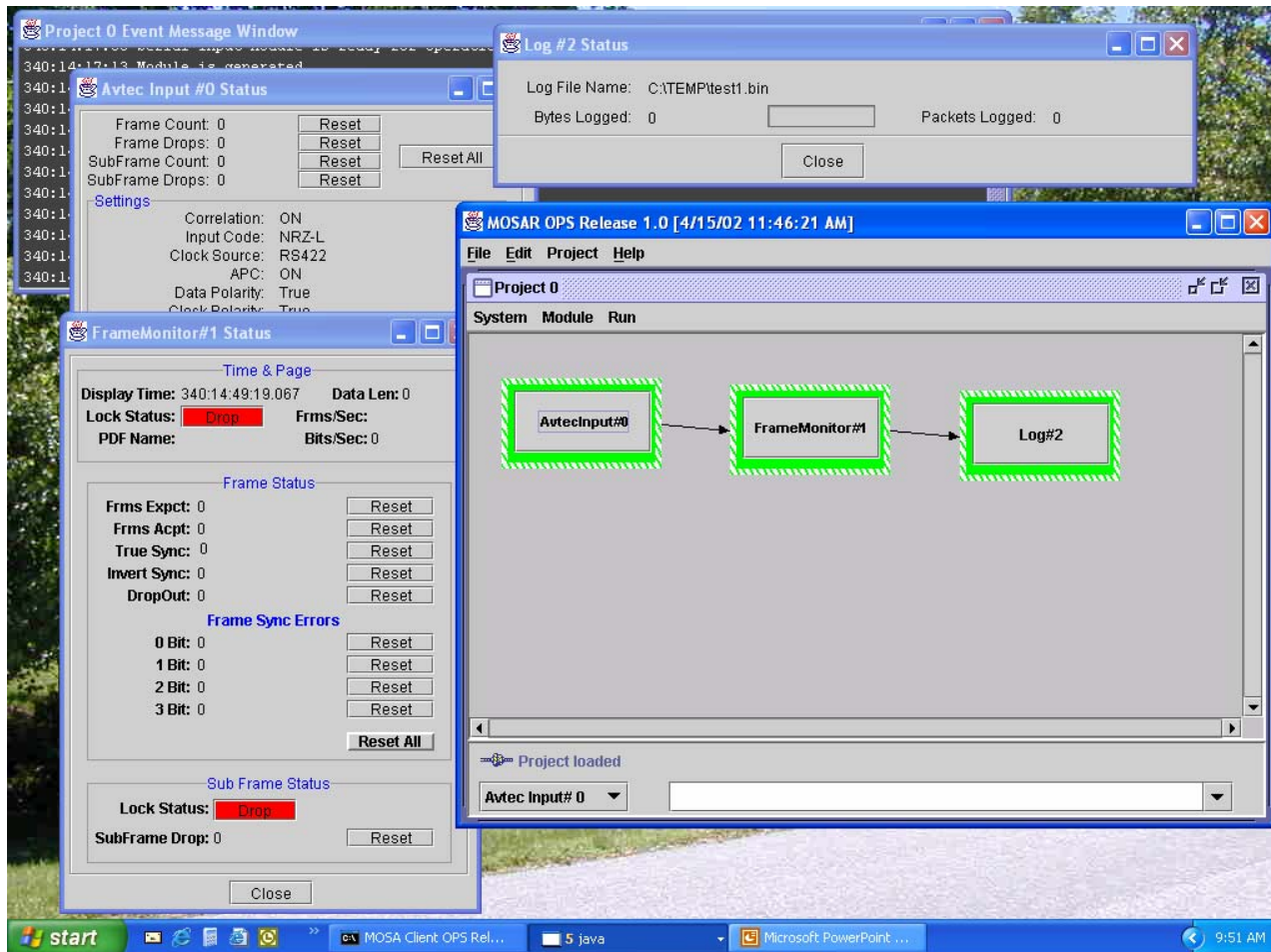


Running the Project



When an individual module is stopped the module outline turns red.

Running the Project



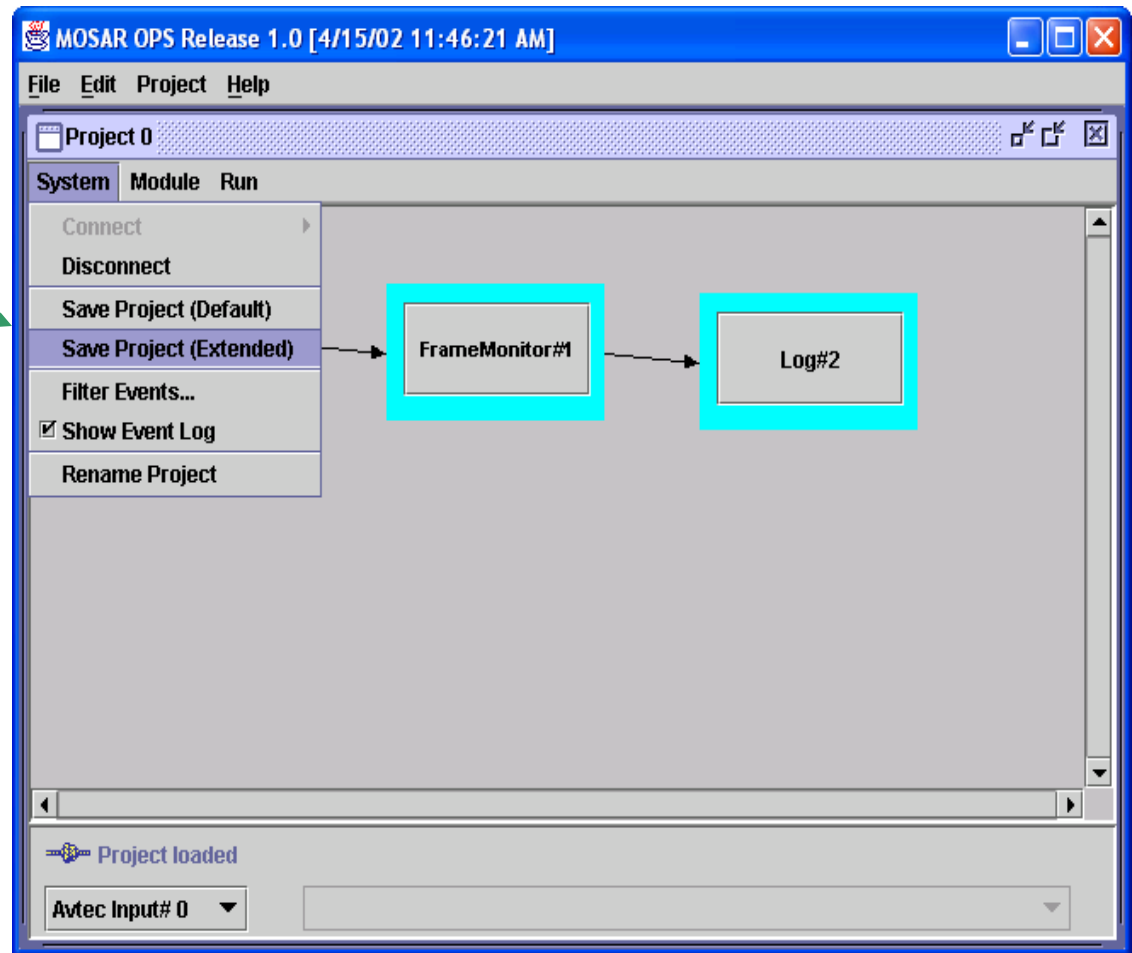
With the project in Run mode the user can open the desired status displays.

Saving the Project

To save a project it must be stopped and unlocked.

Click on **System**. Select the **Save Project (Extended)**.

This is a more flexible and reliable save method.



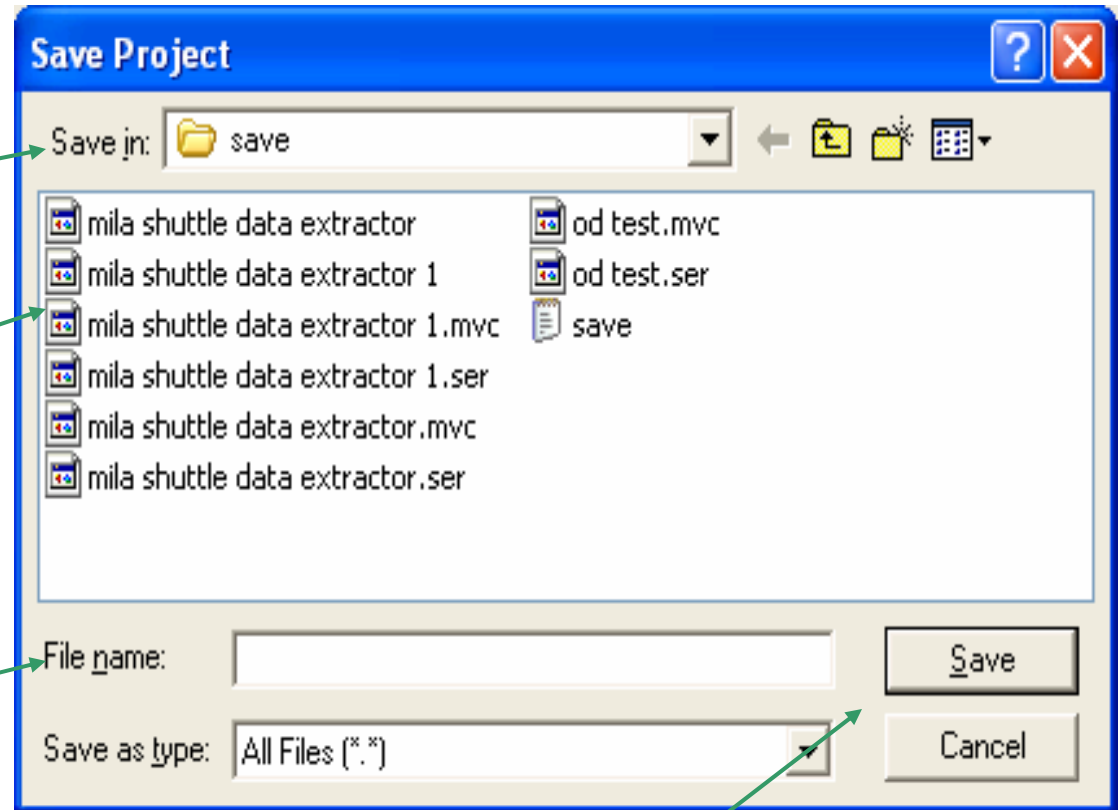
Saving the Project

The Save Project Window will open

Directory the project will be saved in

Previously saved projects. Note: each saved project creates 3 files.

Enter the name that you wish to use to save the project.



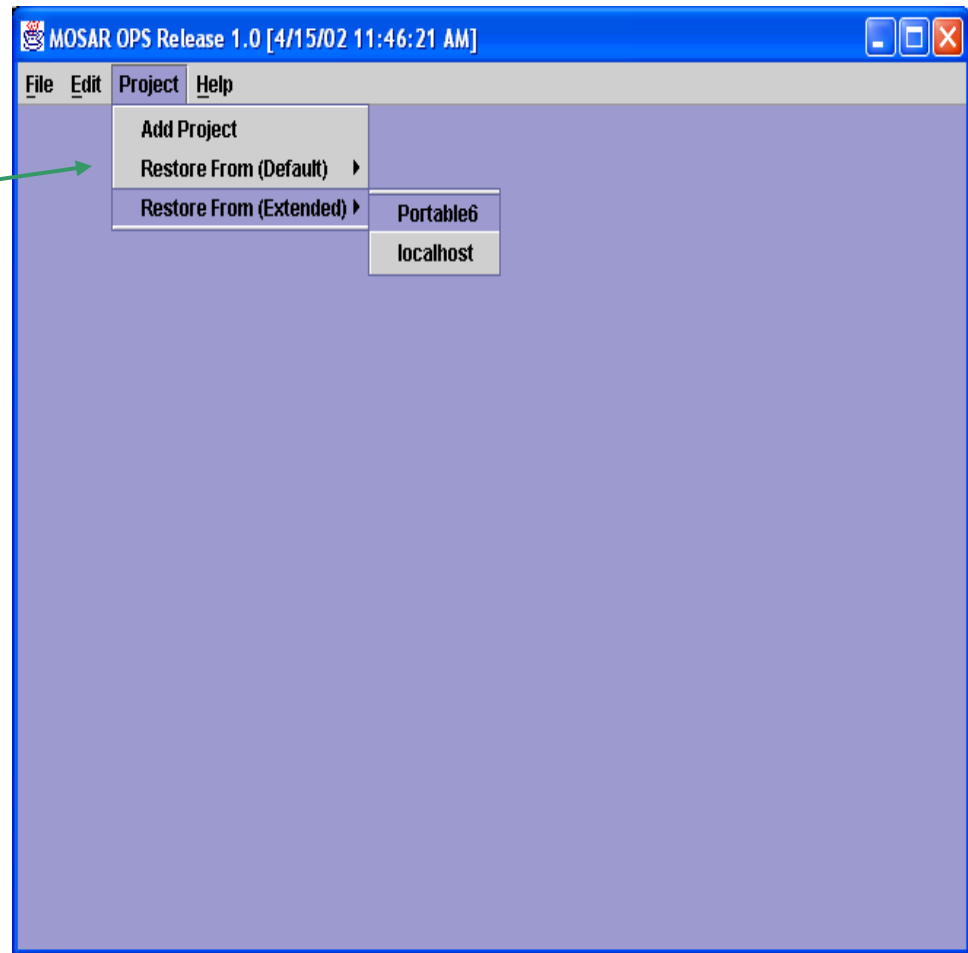
After the file name is entered click on the **Save** button

Restoring a Project

Select **Project**. If the project was saved using the extended mode, select **Restore from (Extended)**.

The system allows for the Client and Server to be ran on separate machines. If this option is being used then multiple names will appear.

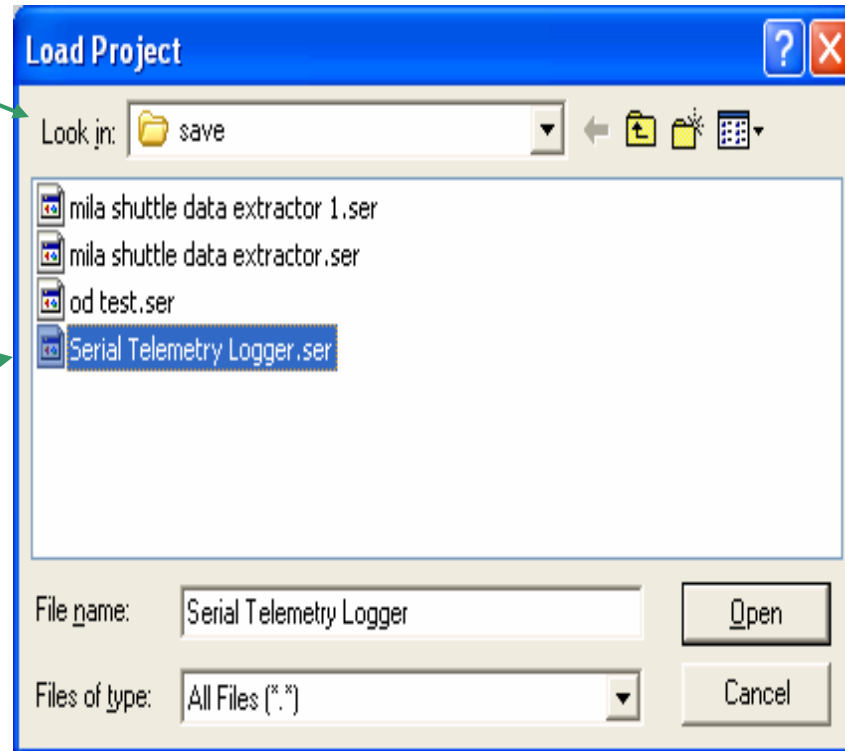
These names are defined in the **Servers.txt** located in the Properties subdirectory of the Client software.



Selecting the Project

Directory selected. Use the pull-downs to change directories

Select the project you wish to restore. It will be highlighted when it is selected. Click on **OPEN** to restore the project.



Restoring a Project

Name and Location of the project loaded.



All that is required to run the project is to go to **Run** and **Lock** the project. Then go to **Run** and click on **Run** on the drop down menu.

